

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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On Improvements in Machinery for Rolling Iron and Steel Plates.*

Before proceeding to describe the nature of the proposed improvements, it will be well to notice briefly the method generally adopted at present in rolling plates, as compared with that in use for producing flat bars, angles or other sections.

These latter forms of manufactured iron are produced by means of rolls with several grooves of gradually decreasing sectional area cut on their surfaces, so that generally two, and sometimes three, pairs of rolls are required to contain the number of grooves or spaces necessary. Thus the production of large sections of angle, tee, channel iron, &c., is very expensive on account of the first cost of the rolls, in cases where the section is an unusual one and the quantity of lengths required is not large. On the other hand, as the bar is rolled to its exact section and no allowance need be made in forming the pile for waste in shearing (except so much as is necessary to insure a clean end to the bar), the cost per ton rapidly diminishes with the increase in quantity produced.

Thus, of all forms of rolled iron, double-headed rails are the cheapest; then follow the commoner sections of angle iron, &c., used in shipbuilding, while the most expensive forms of all are the heavier sections of channel and joist iron, the cost of which is not only augmented by the ordinary difficulties attending their manufacture, but also, and perhaps to a still greater degree, by the smallness of the quantity required at one time.

With plates another state of things exists, and totally different conditions have to be taken into account in estimating the cost of any given specification. Here the cost of the rolls is not to be considered, nor is the quantity required at one time of much importance. The chief point affecting the cost of production (supposing the specification to require only plates of ordinary length, breadth and thickness) is the variable proportion of waste in rolling plates of different

rough 12-inch strip, is cut to waste on the edges alone. In other words, whereas a pile of 6 cwt. would be heavy enough to make a bar of a given weight 12 inches wide, a 9-cwt. pile would be required to produce a sheared plate of corresponding dimensions. This difference, of course, decreases as the width of the bar or plate increases, because the proportion which the allowance for waste bears to the whole mass becomes less and less the wider the plate. In all cases, however, to insure a sound edge, a very liberal allowance must be made, notwithstanding which there is a very great loss in all plate mills, due to the pro-

vertical rolls move a little faster than those of the horizontal rolls. In practice it is not found desirable to compress the edge much more than is just about sufficient to preserve, without decreasing, the width, and the piles are generally made about the same width as the finished plate is intended to be. This implies the necessity for great diversity of width in the puddled bars, a difficulty which is usually got over in Belgium by using several narrow bars of variable width to form the tops and bottoms of the piles. Thus, from a stock composed of 5, 6, 7 and 8 inch puddled bars, piles of all widths above 10 inches could be built up,

perhaps, however, the most important point in its disfavor, especially for rolling steel, is the limit to the width of plate that can be produced by it. If the horizontal rolls are 6 feet 6 inches long, and the verticals 2 feet in diameter, 2 feet 6 inches would be the limiting width of plate for such a mill; since the vertical rolls when opened to such an extent come in contact with the standards. This was the limit at the Britannia Works; and plates were rolled there 32 feet long, by 2 feet 6 inches wide, $\frac{3}{4}$ inches thick, with perfectly sound and straight edges. No greater difficulty seems to attend the manufacture of wide than of narrow plates, ex-

consequently, rises or falls as the top roll is adjusted in height. By working the screw E a motion in the direction of its length is given to the top roll A, its necks being of such a form as to allow of this motion, while the bottom roll B remains firmly fixed between the standards. Attention to the drawing will show that end motion being given to the top roll A, it will carry with it the collar D, while collar C remains stationary, and by this means the distance apart of the two collars is adjusted *ad libitum*, being limited only by the travel allowed to the top roll A in the direction of its length. The illustrations show the form of box and spindle which has been adopted, and which has been found to present no inconvenience. The rolls are adjusted vertically in the usual way, but clearly they must not be allowed to open so far as to draw the collars out of the grooves. As this system of rolling is applicable to every stage of the process—forge rolling, blooming, roughing down and finishing—and to steel from the ingot as well as to iron from the pile, it will be necessary to describe it in connection with all these separately, as it will be found that there are certain points in each requiring special consideration.

Firstly, as to forge rolling. It is at all times inconvenient to use very wide piles, on account of their not heating uniformly, and of the space and height required in the furnace to allow of their being turned; hence, it will probably be found that rolls arranged for bars varying in width from 12 to 24 inches will meet all requirements. The collars and grooves would have to be of such a size as to allow of a vertical adjustment of about 5 inches. Such a mill would be an extremely simple affair, and need not be further described, but its use would be attended with great advantage in connection with all plate mills, whether the bars were to be afterward used in mills of the same construction or not. The same may be said as regards mills rolling large sections of bar iron, as the same pair of rolls would produce bars of any width, obviating the necessity for frequent change of rolls.

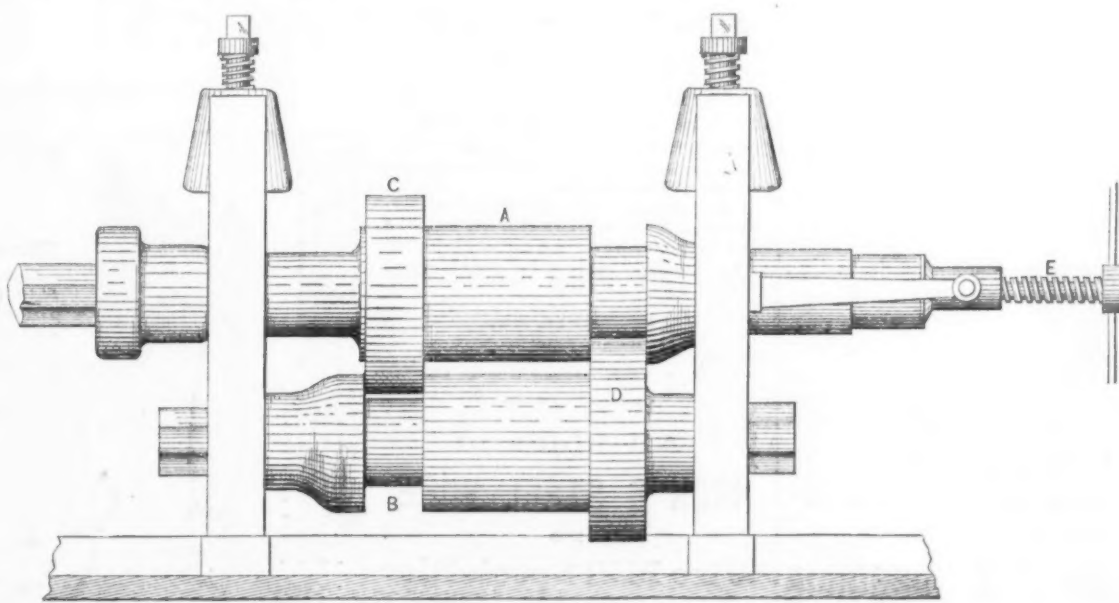


Fig. 1.—Elevation of Hutchinson's Rolling Mill.

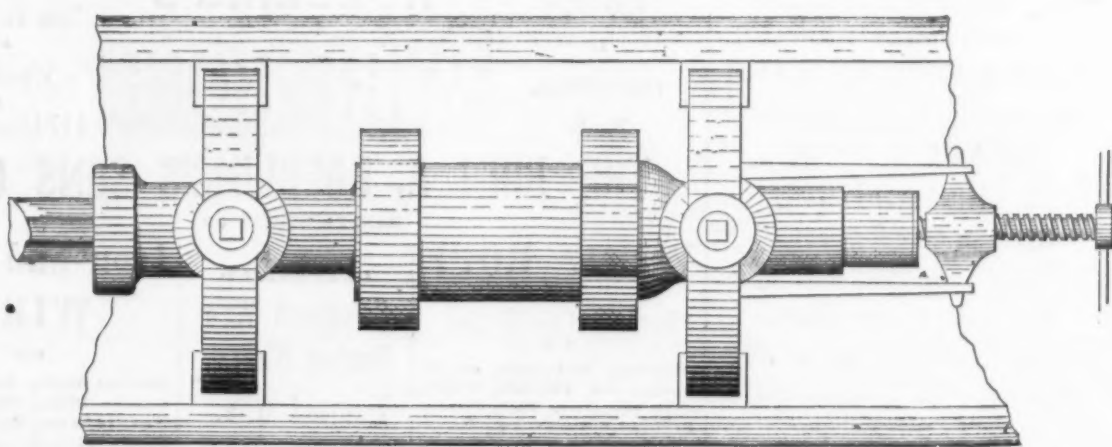


Fig. 2.—Plan of Hutchinson's Rolling Mill.

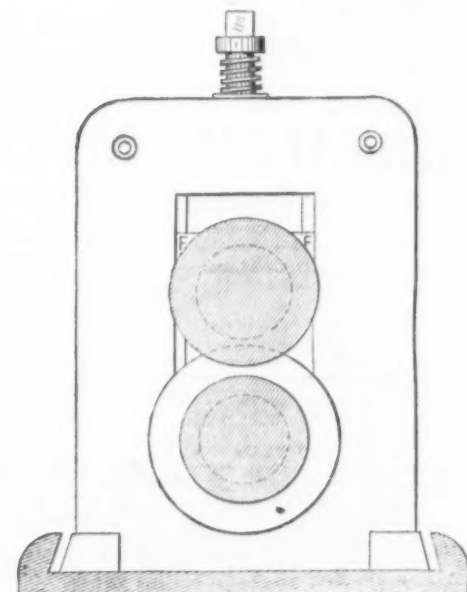


Fig. 3.—Vertical Section of Hutchinson's Rolling Mill.

HUTCHINSON'S IMPROVED MILL FOR ROLLING IRON AND STEEL PLATES.

widths and lengths, due to the fact that a certain width must be sheared off each side, as well as off the ends.

In the trade a bar is supposed to be 8 or 9 inches wide and under. All above this are taken as plates unless specially ordered as bars, most large bar mills now rolling bars up to about 12 inches wide if required. Bars above this latter width become very expensive, chiefly on account of the number of rolls which would be required for intermediate widths, &c., as well as the great number of sections of puddled bars which it would be necessary to provide. All above 12 inches wide and many under are, therefore, rolled as plates, and sheared on the sides as well as the ends. The process may be described as follows: A pile is made of puddled bar and of scrap, the latter composed of the shearings off finished plates. The puddled bars are generally from 12 to 18 inches wide, the width being regulated to some extent by that of the finished plate intended to be produced. After being heated, the rough pile is first put through blooming rolls, to close the edges and to compress and solidify the mass. It is then turned sideways to the rolls, and put through the roughing rolls as many times as are necessary to bring it to the required width, allowing a margin for shearing and for inaccuracies as to straightness, &c. It is then turned again and gradually elongated, partly in the roughing and partly in the finishing rolls, until brought down to the required gauge, regardless of its length. In order to insure a perfect plate, it is necessary to allow, say, at least 3 inches on each side in a strip of fair length, so that more than 30 per cent., in a

portion of plates which, owing to defective edges, will not cut to the size required. In steel the difference in value of the finished plate and that of the resulting scrap is, of course, greater than in iron, and the resulting loss is more serious in the same proportion.

In order to overcome these objections to the prevailing method of rolling plates, at least as regards narrow plates, the mill known as the "Universal Mill" was devised. It has also been called the Belgian mill, from its frequent adoption in Belgium. In this country it has not been generally successful, owing chiefly, it is believed, to the objection English workmen have to novel appliances, or, rather, perhaps to the difficulties which manufacturers in this country experience in adopting labor-saving machinery. The writer, however, has had an opportunity of judging of its merits during several months' fair work at the Britannia Works at Middlesborough-on-Tees. The construction of the Belgian mill is not, in a strict sense, of a complicated nature. When, however, we consider the great strength required for every part of this class of machinery, the rough usage, and the enormous cost of breakdowns and delay, we shall find that there are certainly more parts requiring careful adjustment about the Belgian mill than is consistent with the highest economy in production; in other words, if bars could be rolled in ordinary rolls of the same widths as in the Belgian mill, the latter could not compete with the former in point of economy. The Belgian mill is simply an ordinary mill with a pair of vertical rolls behind the horizontal ones. These catch the plate as it leaves the horizontal rolls, and compress the edge sufficiently to close and solidify it. The surfaces of the

rising by inches. It is, however, impossible to admit that a plate so made—i. e., with a welded instead of a solid surface—can be so sound or so uniform in tensile strength across the grain as one produced in the ordinary way. Most Belgian mills, probably with a view to avoid expensive complications, consist of only one pair of horizontal rolls working in combination with vertical rolls, and these are usually in connection with an ordinary plate mill. This prohibits a large production, as the rolls become too hot if the work is continuous.

The manipulation of the Belgian mill is by no means a simple matter, nor can it be placed in the hands of inexperienced or unskillful workmen. The slightest maladjustment of the screws, either of the vertical or horizontal rolls, will cause the plate to twist; while, if the vertical rolls are allowed to exercise any undue pressure on the edge, it becomes thickened to such a degree that the plate is sure to curve more or less the next time it is passed through the rolls, and any attempt to straighten it afterward is generally useless. Under any circumstances the action of the vertical rolls is, to a certain degree, objectionable. The pressure, however slight, has a tendency to open the edge, and the thickening, which it is always difficult to avoid entirely, is for many purposes a serious drawback, as, for instance, where a number of plates of uniform width are placed in juxtaposition, as in the flange of a large girder. The difficulty of keeping the plates straight, and the impracticability of afterward straightening them, as already mentioned, will always be an objection of greater or less importance to the general adoption of the Belgian mill. To these may be added its great expense, as well in first cost as in maintenance. Per-

cept a tendency to buckle when the plate is very wide and thin. This tendency to buckle, or bend up, between the vertical rolls would require, in plates above 2 feet wide, to be obviated by some special contrivance. This has not yet been worked out, and, although it is obvious that such an appliance could be devised, this complication would add very materially to the objections which already exist.

The advantages of the Belgian mill may thus be said to be confined to large establishments where more than one plate mill is in constant operation, and where a sufficient quantity of plates under about 2 feet 6 inches in width may always be selected from the orders in hand. Under such circumstances a very considerable saving may be effected. Whether or not it could be profitably applied to all classes of work is a problem which could be solved only at considerable expense.

The accompanying illustrations show the general construction of a sliding roll mill, designed to accomplish the same object as the Belgian mill, without being open to any of the more serious objections to the use of the latter. The construction of this mill may be thus described: The ordinary rolls of a plate mill are removed, and in the same standards a pair are substituted of the form shown on the drawing. It will be seen that the top roll A and the bottom roll B are nearly alike in form, and that a collar, C, is placed on the top roll A, and a collar D on the bottom roll B. These collars are not cast solid on the rolls, but are capable of sliding them, being held, however, in one position, as regards the other roll, by corresponding grooves. Applied to the end of the top roll A is a powerful screw, E, which takes its thrust from the top chock, and,

Secondly, with regard to blooming. In some mills this operation could be advantageously combined with roughing down, and both operations done in the same rolls, the latter process being in fact but a continuation of the former. Where large plates were made, however, this would be found impracticable, as sufficient vertical adjustment in the top roll could not be obtained in one pair of rolls without cutting very deep grooves, and so leaving the roll dangerously weak. It is therefore necessary to have blooming rolls with a vertical adjustment in ordinary mills of about 5 inches; so that, taking a pile 12 inches deep, they would squeeze it down at once to 10 inches, and then by successive adjustments of the rolls to a minimum thickness of 7 inches, at which the roughing rolls are calculated to deal with it.

Thirdly, as to roughing down. This, as already stated, is simply a continuation of the blooming process. It must be remarked, however, that provision has only been made for puddled bars up to 2 feet wide, and perhaps even this is somewhat in excess of what could be used with due regard to economy of height and space in the heating furnace: hence all plates above this width would have to be rolled with their length in the direction of the width of the pile. There is no objection whatever to this, and it is frequently practiced for convenience sake in ordinary plate rolling. In these cases the length of the pile would correspond as nearly as may be with the width of the plate.

Fourthly, as to finishing rolls. These are made with still smaller collars than the roughing rolls, the adjustment necessary being extremely limited, say from $\frac{1}{4}$ to $\frac{1}{2}$ inch; in other respects the rolls are of the same general form. It will be seen that it

* Read before the Institution of Mechanical Engineers by Mr. Edward Hutchinson, of Darlington, England.

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is impracticable to provide for more than a limited length of travel for the top roll in any case, but more especially is this true of the finishing rolls, where the pressure in rolling is greatest; otherwise the rolls would become dangerously small in diameter in proportion to their length. In practice it will probably be found that a travel of about 2 feet will be as much as is convenient. So that beginning at 12 inches width, one pair of rolls would finish up to 3 feet and all intermediate widths. Another pair would begin at 3 feet, and with a travel of 2 feet would finish up to 5 feet, covering all intermediate widths. Where two mills were in constant operation the one could be kept on the narrower and the other on the wider plates; but where only one was in use the rolls would have to be changed occasionally, probably not more frequently than once a week.

The relative merits of this system of rolling as compared with those of the Belgian mill may be briefly noticed. It will be at once remarked that no real side compression can be given to the pile when rolled in this way. In practice, however, this cannot be effected even with the vertical rolls in the Belgian mill; nor is such compression necessary or desirable, as the pressure of the main rolls is quite sufficient to squeeze the piece laterally to such an extent as to make it fill the space between the collars in the one case, and between the vertical rolls in the other, and so form a close sound edge. But while in the Belgian mill the plate is subjected first to vertical pressure by the main rolls, and then to lateral pressure by the vertical rolls, in the sliding roll mill the pressures on sides and surface are simultaneous; and consequently no thickening of the edge or other similar imperfection is possible.

In the Belgian mill the pile must invariably be put into the rolls endwise, so that every pile must be made as wide as the plate to be rolled from it. This is a great difficulty when the plate is over 18 inches wide, and, so far as the writer is aware, has yet to be overcome. The collared roll is also much more readily adjusted to width than are the vertical rolls of the Belgian mill. In the latter case not only the rolls themselves, but also the guides, both before and behind the rolls, have to be adjusted with the greatest nicety. This causes considerable loss of time and waste of fuel and material, as after every readjustment one or two experimental plates have to be rolled to test its accuracy. The difference between the two mills in point of first cost need hardly be pointed out. The sliding roll mill does not greatly exceed, either in first cost or working expenses, a mill constructed on the present model; while a Belgian mill would cost about twice as much. Lastly, the rolling of steel plates by means of the machinery described will obviously present no difficulties. This point has already been alluded to; but inasmuch as rolling iron from a pile is a much more complex operation than rolling steel from a solid ingot, the former process has received for the present the most attention, more perhaps than its declining importance deserves. Steel plates must sooner or later be used, to the very general exclusion of the inferior material; and it is confidently believed that the adoption of the process described would go far to lessen the great difference at present existing between the cost of making steel plates and that of making iron plates of an equal weight.

SCIENTIFIC AND TECHNICAL.

Mr. Eugene Vanderpool, in a paper read before the Society of Gas Lighting, gives the results of some experiments made by him and Dr. Schuessler to determine

THE CALORIFIC VALUE OF GAS.

He heated 2.75 lbs. of water from 68° F. to 150 degrees by 0.709 cubic feet of ordinary 16-candle coal gas, thus finding that one cubic foot will develop 315 heat units. A mixture of 65 per cent. of hydrogen and 35 per cent. of carbonic oxide was then tested, with a view to obtain approximately the calorific value of water gas, the composition of which approaches these figures. They found that it took 1.65 cubic feet of this gas to heat the same amount of water to the same temperature, showing that one cubic foot of the gas mixture developed 136.6 heat units, considerably less than illuminating gas.

According to Dingler's Poly. Journal, B. Lewisohn & Co., of Stuttgart, Germany, have invented a process for

PHOTOGRAPHING ON LEATHER,

or, at least, preparing leather for receiving photographic images. They first coat the material, black leather being the best, with a thin film of varnish, and then with a mixture of albumen and white lead. After drying, the photograph is made in the usual way.

Some time since news was received by cable from England to the effect that Mr. MacTear, a chemist at the St. Rollox Works, Glasgow, had discovered a process for making

ARTIFICIAL DIAMONDS.

This statement was not supported by any particulars which might serve as a guide in determining the value of the process or the nature of the product obtained. Professor Maskelyne, a prominent chemist, now lays before the public the proofs that the crystals made are not diamond, but consist of a compound of silica, or possibly of more than one such compound. The materials submitted to him by Mr. MacTear were too small to see unless by very good eyesight or with a lens. They did not even scratch a polished surface of sapphire, and did not have the optical properties of the diamond. They did not burn before the blow-pipe. He found, however, that the supposed diamond particles would dissolve in hydrofluoric acid, and that the solution evaporated to dryness left behind a slight reddish-white incrustation.

Herr Carl Vogt, at a recent meeting of naturalists at St. Gallen, Switzerland, made some interesting observations in regard to

THE ARCHÆOPTERIX.

a fossil, the complete skeleton of which was recently discovered in the Solenhofen slates. The animal is half a reptile and half a bird, and is one of the strongest points of evidence in favor of Darwin's theory in regard to the

descent of birds from reptiles. When the first incomplete specimen, now in the British Museum, was discovered it was declared to be a bird because it possessed a bill, feathers and claws. The complete skeleton now found has shown that the animal has many of the characteristics of a reptile, having scales as well as feathers, a bill and teeth, claws on its wings and a tail.

The desirability of avoiding the leakage of bottom seams in boilers has led to the introduction of sundry experiments to overcome the difficulty.

RECENT IMPROVEMENTS IN BOILER MAKING in England show a tendency toward the adoption of the system of welding the plates in complete rings, so as to avoid the necessity of having a rivet joint in the bottom of the boiler. This plan of construction is now in extensive use by a number of firms in England, and some little time ago the advisability of introducing the welding process into the engine department of the Palmer Shipbuilding and Iron Company (limited), Jarrow, was under the consideration of the managers of that firm; but while it was admitted that welding the plates into one ring provided the remedy desired, it was looked upon with suspicion alike by Lloyd's Association and the representatives of the Board of Trade, on the ground that the soundness of the work was dependent upon the individual skill of the workman employed in the operation of welding. Out of the consideration and thought devoted to this important subject, however, a new method to overcome the acknowledged difficulty was hit upon. The boiler plates are made sufficiently long to enable a complete boiler ring to be formed of only two plates, instead of several short ones, as is the custom in the ordinary mode of construction. The first barrier, that of getting plates rolled up to the requisite dimensions, was speedily surmounted by Mr. Roberts, the manager of the Jarrow Rolling Mills, who, by means of new large rolls, was able to turn out boiler plates weighing, when finished, from 33 cwt. to over two tons. The second difficulty, however, was not so readily mastered. By the use of the ordinary horizontal "bending rolls" the work of bending the extra-sized plates into proper "set" was found to be an operation of very great difficulty, and entailing the expenditure of a large amount of additional time and labor. At length, however, Mr. William Gibb, the manager of the engine department, conceived the idea of using vertical "bending rolls" in lieu of the horizontal rolls. The idea was promptly developed, and a set of the new style of rolls has just been erected at Jarrow by Messrs. Scriven & Co., of Leeds Old Foundry, to whom the task of designing and making the new plant was intrusted by Mr. John Price, the general manager of Messrs. Palmer's. The new rolls are of exceedingly simple arrangement, and are eminently successful, for by their use there is a large saving of the labor and time consumed in the ordinary course of plate bending; and what is of equally valuable importance, the required "set" of the plate is obtained to a nicety, and with perfect ease.

THE REVUE INDUSTRIELLE DESCRIBES AND ILLUSTRATES IN A RECENT ISSUE, FARCOT'S CONTINUOUS ILLUMINATING GAS PROCESS.

His apparatus consists of a short iron charging hopper, from the lower end of which elevator buckets carry the coal to the retort. The latter is a cast-iron or fire-clay box, within which a circular disk mounted on a vertical shaft slowly revolves. The fresh coal is distilled during the time required for about one revolution, as it is carried from off the table by a cast-iron shield under which the former moves. The gas made is washed and purified in the usual manner.

Mr. W. Finlay, in a letter to Engineering, bears witness to the efficiency of

THE PERKINS HIGH-PRESSURE ENGINES.

He states that a 25-horse-power engine, working 10 hours a day for seven years at a pressure of 350 lbs. per square inch, has used 3½ cwt. of coal and half a gallon of distilled water per day. A second 50-horse-power engine has, with the same pressure, worked 2½ years with 5½ cwt. of coal and 2½ gallons of water per day of 10 hours. A 200-horse-power engine, worked only up to 100-horse-power for six months, has a pressure of 375 lbs., with 11½ cwt. of coal and 3½ gallons of distilled water per day.

Dr. Neumayer has presented to the Geographical Society of Berlin, a remarkable photographic apparatus for determining the temperature and currents of the ocean.

It consists of a brass box hermetically closed, and having attached to it an apparatus resembling a vane or rudder. Within this box a thermometer and a magnetic needle are contained, behind each of which is placed sensitive photographic paper, and in front of each of them a small nitrogen vacuum tube. The box also contains a small induction coil. When the apparatus is lowered to the required depth, the rudder causes it to take a direction parallel to the current there existing, and hence a definite direction with reference to the needle within. The thermometer soon acquires the temperature of the water outside and becomes stationary. At this instant an electric current is sent to the box, which, by means of the induction coil inside, lights up the little nitrogen tube, the violet light of which, photographically very intense, prints, in about three minutes, the position of the needle and the height of the mercury column upon the prepared paper. The current is then intermitted, the apparatus raised, the photographic tracing fixed, examined and placed upon record.

Among the various explosives which have been introduced to supersede gunpowder for special purposes, gun-cotton still maintains the foremost place. For submarine mining operations it has no equal, owing to the fact that it is not liable to deterioration when exposed to moisture. Recent experiments have conclusively shown that this substance may be as successfully exploded by detonation when submerged in water and confined only in a rope net, as when inclosed in an air-tight iron case. According to the Universal Engineer, recent

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Swedish & Norway Iron
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Brands of Iron. Also all descriptions of Plate, Sheet,
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Scrolls, Ovals, Half Ovals, Half Rounds, Hexagon and
Horse Shoe Iron. Also from Charcoal Pig a superior
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to J. O. CARPENTER, our Agent, at 59 John
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Galvanized Sheet Iron,
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For Roofing, &c., Galvanized, Plain or Painted.

Best Charcoal, Best Refined and Common

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Plate and Tank Iron,

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All descriptions of Iron Work Galvanized or
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Anthracite & Charcoal Pig Irons,

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have on hand, and offer for sale, the following:
Scotch and American Pig Iron, Wrought, Cast and
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Wrought iron; also old Copper, Composition, Brass,
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Planished Sheet Iron.

Patented March 14th, 1865; April 8th, 1873;
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Guaranteed fully equal in all respects to the

IMPORTED RUSSIA IRON,

and at a much less price.

FOR SALE,

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METAL DEALERS

In the Large cities throughout

THE UNITED STATES.

And at their Office,

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The U. S. Iron and Tin Plate Co.,
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Manufacture to order

BEST REFINED CHARCOAL AND

POLISHED SHEET IRON,

Taggers Iron and Bessemer Steel Plate,
in quality and size to suit the wants of consum-
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Manufacturers of every description of

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Wheeler's Iron & Steel Combination Shafting,

Under license of the Combination Trust Co., Philadelphia.

This Shafting is superior to any now on the market, and the attention of machinists is

particularly called to it and a trial order solicited. Prices furnished on application.

LEECHBURG IRON WORKS.

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Manufacturers of all grades of

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TIN and TERNE PLATES, made with Natural Gas as fuel.

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STEEL AND IRON STRUCTURAL MATERIAL,

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Bar, Sheet, Tank, Boiler, Angle, T,
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And Railroad Equipment.

Nails & Spikes Steel & R. R. Supplies.

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SNOW SHOES.

The only Snow Shoes in the market that abso-
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Improved Snow Shoe Shapes.

Standard Sizes.

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Manufacturers of

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**Siemens' Regenerative
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Having enjoyed for over TWENTY YEARS the reputation of producing the best quality of
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Wrought Iron Roof Trusses, Beams, Girders & Joists,**
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DECK BEAMS, CHANNEL, ANGLE AND T BARS
curved to template, largely used in the construction of Iron Vessels.
PATENT WROUGHT IRON COLUMNS, WELDLESS EYE BARS,
For Top and Bottom Chords of Bridges.
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REFINED BAR, SHAFTING, and every variety of SHAPE IRON made to Order.
Plans and Specifications furnished. Address,
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Patent Planished, Galvanized, Common, Best Refined, Cleaned and Charcoal Bloom
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Orders solicited especially for Corrugated, Gasholder, Pan and Elbow, Water Pipe, Smoke Stack,
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JAS. ROWLAND & CO.,
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Manufacturers of the
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ALLENTOWN ROLLING MILL COMPANY,
Manufacturers of
Rails, Bars, Axles, Shafting, Fish Bars (Plain and Angle), Spikes,
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Analyses of Ores, Waters, Metals and Alloys of all kinds. A special department for the
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fitted with all the apparatus and appliances for the rapid and accurate analysis of Iron, Steel, Iron
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Pig, Bar and Railroad Iron.
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Iron Merchants & Railway Equipments.
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Sole agents Glasgow Iron Co. and Pine Iron Works
manufacturers of Muck Bar and all grades of Plate
Iron. Celebrated "Glasgow" and "Pine"
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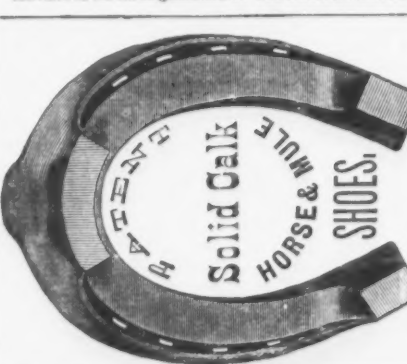
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Manufactured from the celebrated OTIS STEEL
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Quality and efficiency fully guaranteed. Prices as
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Heavy and Light Forgings, Driving and Car Axles,
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Works at Lewistown, Pa.
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Boiler Tubes,**
Steam, Gas and Water Pipe.
Oil Well Tubing, Casing and
LINE PIPE.

Cotton Presses, Forgings,
ROLLING MILL AND
General Machinery.
READING IRON WORKS,
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Connellsville Coke.
ORES, Native and Foreign.
FRANCIS WISTER,
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Best Coke for Furnace and Foundry Use.

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Philadelphia Agents Central Iron Works, Harrisburg, Pa.—Boiler, Ship and Bridge Plates.
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BERWICK R. M. BARS AND SHAPE IRON.
Advances on Consignments of Old Material and sales promptly made.



Philadelphia "STAR" Bolt Works.
NORWAY IRON FANCY HEAD BOLTS,
Carriage & Tire Bolts. Star Axle Clips, &c.
TOWNSEND, WILSON & HUBBARD, 2301 Cherry St. Philadelphia, Pa

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JUSTICE COX, JR. CHARLES K. BARNES.
JUSTICE COX, JR. & CO.,
AGENTS FOR
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CATASAUQUA MFG. CO.'S
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RAILROAD CAR AXLES.
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PETER WRIGHT & SONS,
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NEW AND OLD RAILS,
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Sole Agent for the MONOCACY FURNACE CO.

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And other Favorite Brands.
SILVER GREY IRON A SPECIALTY.

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Corner South & Penn Streets, Phila.,
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Scrap Iron & Metals, Machinery, Tools,
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Facings. Best Quality Ingot Brass.
Cash paid for all kinds of Metals and Tools.

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Sole Agent for the Sheridan and Leesport Furnaces.

BRADLEE & CO.,
Empire Chain Works,
Keystone Horse Shoe Co.
816 Richmond St., Philadelphia, Pa.
Manufacturers of all kinds of Chains. Also
of the Keystone Patent Solid Oak Horse
and Mule Shoes.
These shoes are made of superior iron, com-
pletely finished and ready for cold shoeing;
have calks and clip. The holes are punched
through at the proper angles and free from
burrs. Same number of Shoes per keg as in
kegs of unfinished shoes.

era for this well known detonating com-
pound. In Panchon's process, cotton is first
thoroughly cleansed by boiling it in an alka-
line solution and exposing it to a current of
air, and then again boiling it in clean wa-
ter. After the second boiling it must be
again thoroughly dried, first by a centrifug-
al machine and afterward by being passed
over a current of hot air, the wet meeting
the cold current, and as it dries rising to a
temperature of about 120° F. The cotton,
in charges of one pound each, is then steeped
for five minutes in a bath containing three
parts of sulphuric acid and one part of nitric
acid, after which it is taken out and placed
in an iron cylinder, and a perforated piston,
about 8 inches in diameter, is forced down
upon it by hydraulic pressure. The excess
of acid pressed out of the cotton passes
through the perforations in the disk and is
pumped off; this is afterward resold at 3/4
per pound. The cotton is then placed in
glazed earthenware jars, which are covered
in order to prevent any heating taking
place, the jars being placed in a current of
cold water, where they are allowed to re-
main for 24 hours, after which the cotton is
taken out and again thoroughly washed, and
while yet damp is passed between rollers
until it is reduced to a very fine powder;
this process being gone through while the
compound is damp, prevents any possibility
of an explosion. The powder is then mixed
with a certain quantity of sugar, nitric acid
and water, into a pulpy mass, which, after
being strained through a fine sieve, is care-
fully dried in a temperature never exceed-
ing 120° F. The manufacturing process is
finally completed by passing it through roll-
ers under very high pressure, by which
means it is compressed into a hard substance
and rendered almost impervious to damp.
The gun-cotton intended for blasting pur-
poses is made into thin cakes, broken and
irregular in size, but for rifle cartridges it is
made in small fillets, similar in form and
size to rape seed.

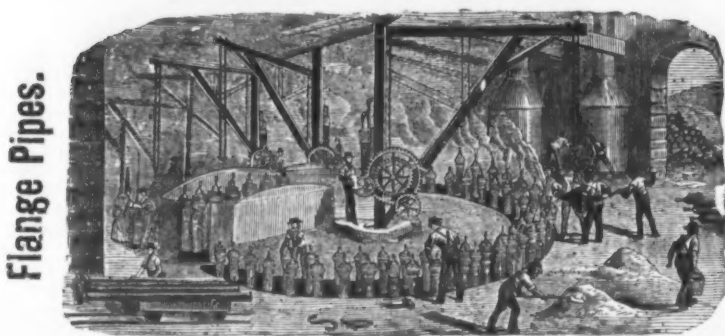
A gentleman formerly connected with the
Philadelphia Ledger is reported to have dis-
covered
A SIMPLE FORM OF AUDIPHONE,
which he has tried with satisfactory results,
although he is very hard of hearing. A few
days ago he was explaining the principle of
the audiphone to some friends, and to illus-
trate his remarks, put a folded newspaper
between his teeth, bending it over in the
form of the audiphone. To his surprise he
found that he could hear as well with the
newspaper as with the audiphone. He sub-
sequently attended an auction sale, and put-
ting the catalogue between his teeth and
bending it down with one hand, heard all
that was said, although without some such
contrivance he could hear nothing. The
experiment is a very simple one, well worth
trying by all who are hard of hearing.
Newspapers, pamphlets, card boards, even
sheets of writing paper seem to serve the
purpose as well as the hard rubber audi-
phone.

Dullness in Export Markets.
A reporter for *The Iron Age*, in going the
rounds of some of our largest shippers and
commission merchants, inquired of the se-
nior member of a leading firm concerning
the outlook for the coming year for the gen-
eral run of American manufactures, without
any reference to the heavy staples. The
prompt reply was: "On the whole, very
cheerless. There's no foundation for prices,
and everything is demoralized. Matters
were bad enough before, but the 1st of Jan-
uary brought us all up standing, and we
don't know where we are. The fact is," he
added, "everything depends on whether we
can keep abreast of England in prices, for
if she can sell lower, then she must take the
trade." His apprehension seemed to be, as
subsequently explained, that in the rapid
advance in prices, caused by the boom in the
domestic trade, foreign markets are to be
sacrificed. Already, it was remarked, pur-
chases are made in the American market to
no small extent, rather because of the supe-
rior quality of goods, or for the reason that
certain descriptions cannot be had else-
where, than because it is easier to buy.
Regret was expressed that the current of
events should tend, in any degree, to throw
the fields we had so diligently cultivated
back into the control of English manufac-
turers. Immense sums expended on travel-
ers and specimen goods become a useless
investment. Our informant remarked, fur-
ther, that he was not sorry to see a general
rise impending abroad, and he believed
things would improve in our export trade as
the year advanced.

A mercantile correspondent in London
writes to his principals in New York, under
the latest date, that the business outlook
was decidedly worse than a month before,
when there was some hopefulness; but now,
he says, "all is gone." An analysis of
the increased business done showed that it
was "all due to America, or to buying large
lots of iron to hold by export merchants." In
the colonies, as viewed from the English
standpoint, appearances are not in the least
improved. Australia and New Zealand,
according to the same correspondent, have
never been so bad, one of the largest London
firms—a representative house in the trade—
not having received an order for three
months previously. The only relief to this
sombre statement comes from China and
the East Indies, where there are signs of
recuperation, and in the Argentine Confed-
eration there is an improved state of affairs.
The improvement in Brazil was considered
to some extent illusory, being attributable
to forcing up exchange artificially, and a re-
action was looked for as probable. Those
who have made promises of prompt pay-
ment seem sluggish. From the Cape of
Good Hope accounts are of the same general
tenor, there being little animation, with
prospects far from flattering. In the New
York market the tendency to advance is at
present the most striking characteristic.
In consequence, the leading manufacturers
are accepting orders only at prices at date
of delivery. The effects of discouraging any
export movement are at once obvious.
"Sorting up orders" in a retail way con-
stitutes the bulk of business among the gen-
eral manufacturers. This remark has no
application, of course, to heavy staple
goods.

McNEALS & ARCHER,

BURLINGTON, N. J.



CAST IRON PIPES

FOR WATER AND GAS.

SINGER, NIMICK & CO.,

PITTSBURGH, PA.

MANUFACTURERS OF ALL KINDS OF
HAMMERED AND ROLLED

STEEL,

Warranted Equal to any Produced.

BEST REFINED TOOL CAST STEEL

For Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear-Knives, Cold-Chisels and Machinists' Tools generally.

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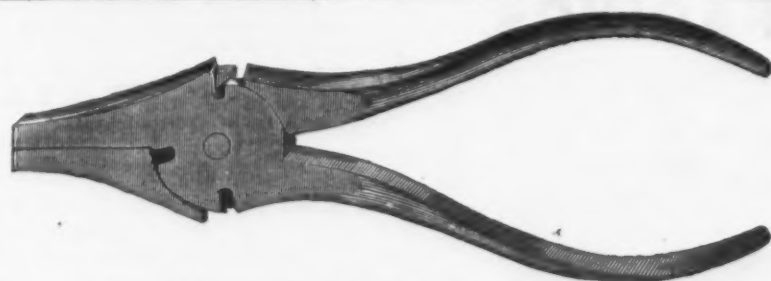
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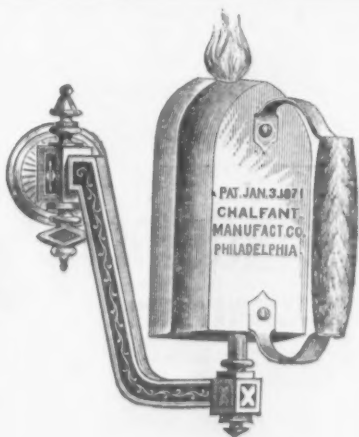
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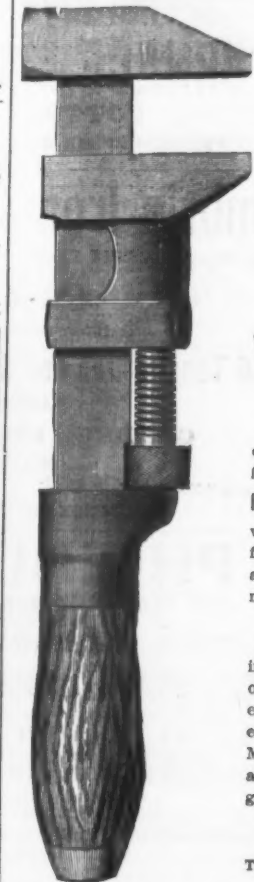
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This laboratory was established in 1856, at the instance of a number of practical iron masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

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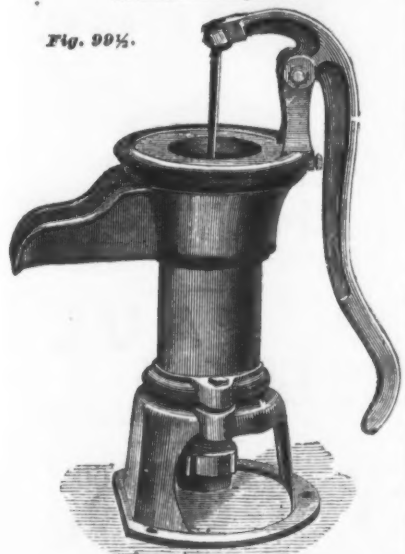
For determining the per cent. of Pure Iron in an ordinary Ore.....	\$4.00
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Fig. 99½.



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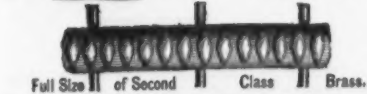
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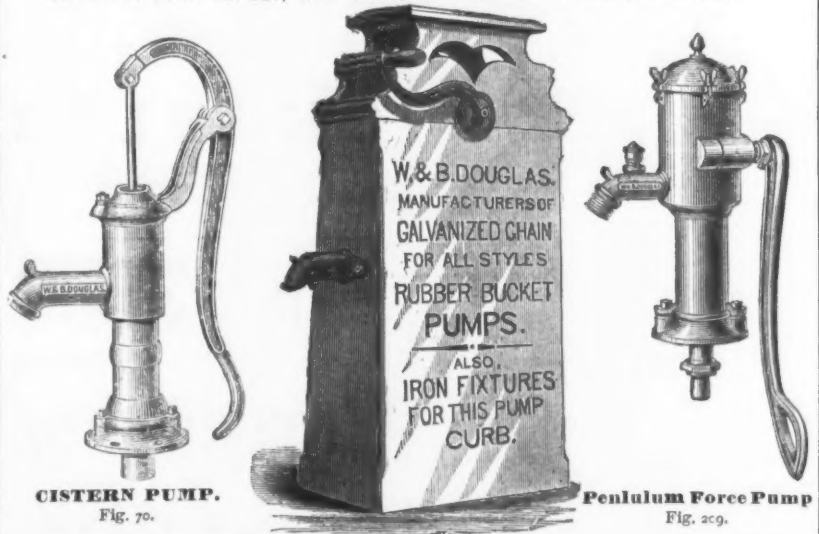
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Fig. 70.Penulum Force Pump
Fig. 209.

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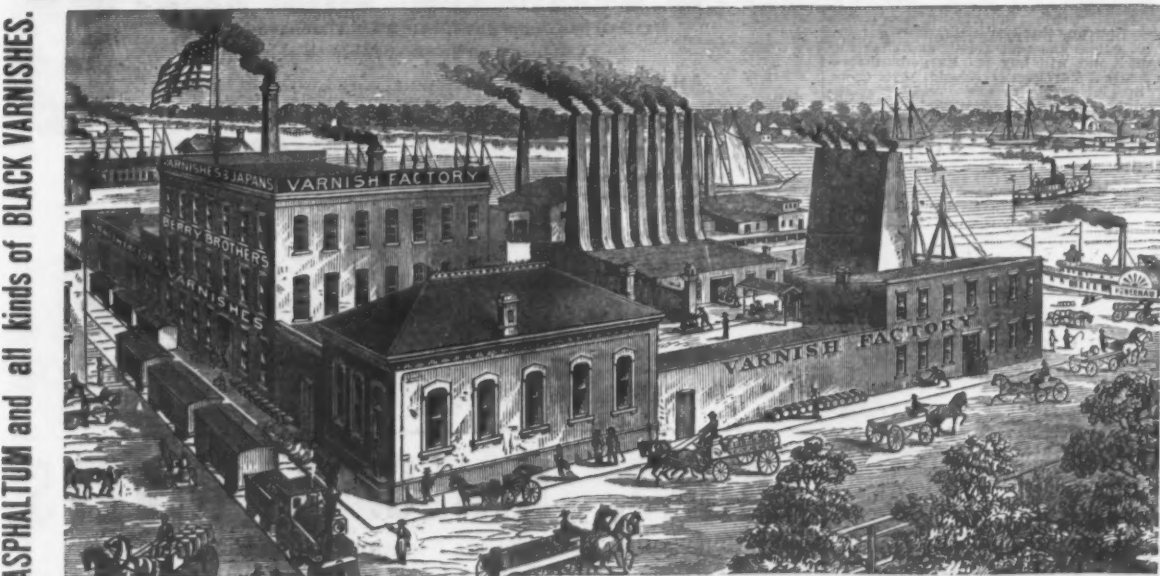
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West Lombard St.; PHILADELPHIA, 57 North Front St.; BOSTON, 141 Milk St.; NEW YORK, 279 Broadway.

The Barff Process for the Protection of Iron.

The Barff process for the protection of iron surfaces from rust has been before the public, in one form or another, for several years, and great interest has been manifested by manufacturers in the methods by which the results have been accomplished. Professor Barff, however, does not appear to be satisfied with his apparatus, for, although it has been described in a general way, no details of a satisfactory nature have been made public. The readers of *The Metal Worker* are aware, from the articles which have appeared in its columns, that the object of the process is to deposit a thin film of the black or magnetic oxide which shall be closely adherent to the iron treated. As this oxide is almost unchangeable by any ordinary means, a perfect protection against rust is given to the iron beneath.

The great difficulty which was first experienced was in securing the adherence of the coating, which was obtained by the exposure of the iron to be coated to the action of steam in a heated chamber. At first saturated steam was employed, which produced a covering of red oxide, reduced by the liberated hydrogen to metallic iron, and subsequently converted into black oxide as the steam became superheated. This

A, the flow being controlled by the cock C. It escaped from the treating chamber or muffle A into the air by means of the pipe D.

The changes which would be necessary in this apparatus to make it effective are so simple as to suggest themselves to almost anyone. Fig. 2 shows the arrangement finally adopted. Here steam is generated in the boiler B, which is furnished with a safety valve in the usual manner. The pressure employed is about 10 pounds per square inch. Steam passes from the boiler through the pipe to the superheater C. The latter is a coil of pipe, seen endwise in the drawing, consisting of some 40 feet of 1-inch pipe. It is protected at both sides and ends from the direct action of the flame by fire-brick, as shown. From the superheater the steam passes by the pipe c c to the treating chamber or muffle A, which is kept hot by a separate furnace. This furnace has flues which pass up on each side of the muffle and unite above. The muffle itself is made of fire-brick, which, all things considered, has been found to be the best material for the purpose, being superior to iron. The excess of steam and hydrogen passes off through the pipe d d, and is discharged into the ashpit of the boiler furnace. Economy would suggest that a much neater and cheaper arrangement would be to employ a gas producer on a small scale, and save entirely one of the furnaces. Besides

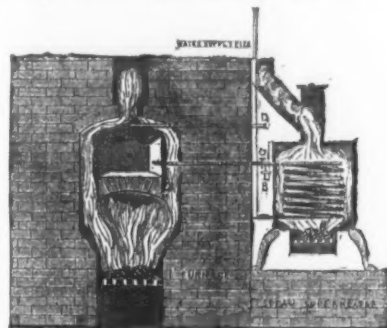


Fig. 1.—First Form of Apparatus.

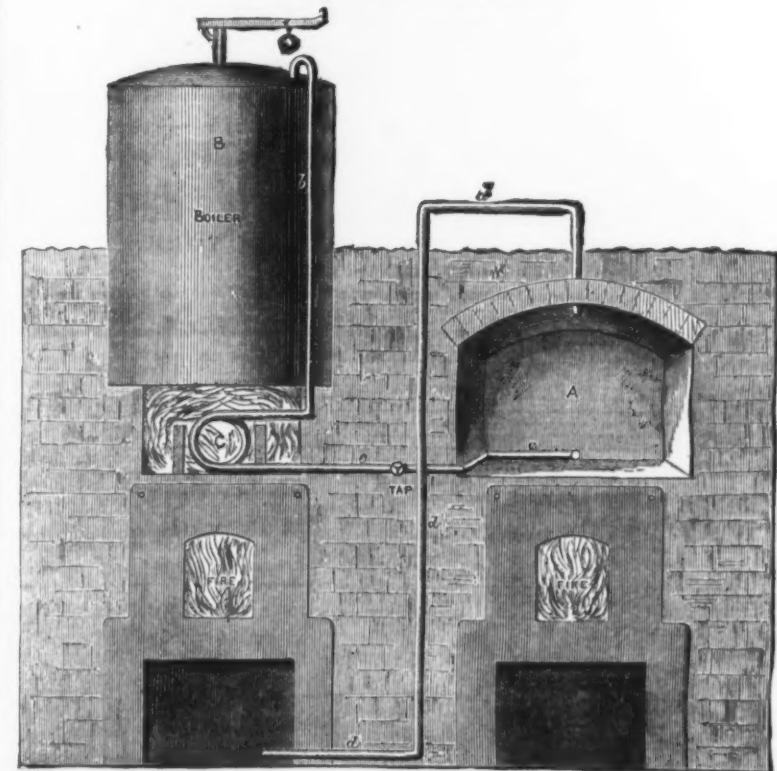


Fig. 2.—Present Form of Apparatus.

THE BARFF PROCESS FOR THE PROTECTION OF IRON.

oxide, however, remained generally in the form of minute scales on the surface, which could be freely detached. While many of the specimens produced in this way showed no signs of rust under very severe tests, others—and by far the greater proportion of them—at once showed indications of rust, which appeared as specks upon the surface. Rust starting in this way soon spoiled the work. It was found, however, after very long experiment, that by the use of superheated steam instead of saturated, the coating of the black oxide became continuous and permanent, and was so closely adherent to the surface that considerable difficulty was found in detaching it.

Fig. 1 shows the form of apparatus first designed for the application of superheated steam to this purpose. The superheater consisted of a coil of pipe placed within a furnace. One end of this coil extended upward for a height of 34 feet, and entered a cistern which was kept supplied with water; the other end entered an iron chamber placed above a furnace. This chamber was furnished with an iron door, in which a tube was fixed to allow of the escape of the hydrogen formed during the process. The water entering at one end of the coil passed out at the other in the form of superheated steam. Several difficulties attended this form of apparatus, the chief being that the steam frequently passed into the chamber without being superheated, and the result was the formation of a loose black oxide on the surface to be protected; air also sometimes penetrated into the furnace. In fact, anyone even slightly familiar with steam and its action, and knowing that continuous supply of superheated steam was necessary, would pronounce this apparatus faulty. The attempt to obtain even dry steam by passing water into a coil of pipe placed in this method in a furnace, is altogether impracticable, unless a separator is used. An example illustrating this point is found in the famous Horroshoff coil boiler, so widely known in connection with fast steam launches and steam yachts. In this boiler, Mr. Horroshoff from the first used a large separator to prevent water from passing into the engine, and in this way obtains perfectly dry steam. In Fig. 1 it will be observed that the steam passes at once from the coil into the chamber

being much cheaper, it would make less trouble in operation. This would be done by carrying a very deep fire under the boiler, say 2 feet thick, and taking the gases obtained from it into a combustion chamber beneath the muffle. Ample heat could be obtained for the production of the small amount of steam needed to keep up the supply for the muffle, while the gas flame around the muffle would be very easily managed. In carrying out the process the muffle is first heated to a temperature of about 500 degrees, when the articles to be treated are introduced, the door is closed, and the temperature is restored. The superheated steam is then admitted, and after a period varying from five to ten hours, the surfaces to be treated are covered with a protecting coat of black oxide. This film is a very good protection against oxidation, and has a good degree of hardness. In this respect it appears to be decidedly superior to any of the enamels now in use. It has the great advantage of withstanding a considerable temperature without undergoing any change. In color the coating is somewhat like that of a casting fresh from the pickle. It is, however, lighter and by no means as handsome. This apparatus is at work on a commercial scale in London, where muffles are in use of considerable size, the largest being 7 feet wide, 3 feet high, and 12 feet long.

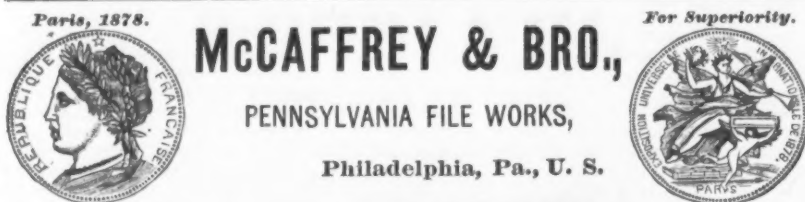
As a submarine engineer Gen. Newton has acquired a wide fame, and is familiar with explosions, but in his proposed improvement of Flushing Bay, L. I., by extending a dyke along the channel—now closed to navigation—he encounters much explosive material, and finds himself in hot water at the very outset of the undertaking. The estimate of cost for a double row of piles, filled in between with stones, so as to form a tidal reservoir between the dyke and the Newtown shore, is \$175,000. Gen. Newton lately signed a contract with Henry Dubois & Sons, of this city, to drive the necessary piling for \$17,000. At this juncture the inhabitants of Newtown, with the aid of Congressman Covert, a brass cannon, &c., held a tumultuous meeting a few nights ago, at which the question was warmly discussed, to be renewed at another time.

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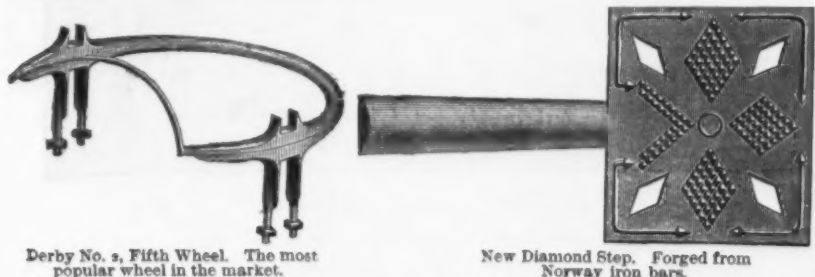
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H. Clapham's, Cast Steel Claw, Lath and Shingling Hatchets, T. & W., Hand-Forged Screw Drivers, Nashua Lock Co., Locks, Knobs, &c., Taylor Mfg. Co., Bells, Weed's Molasses Gates, &c., Fisher & Norris, Anvils and Chain Vices, W. Hunt & Co., Razor Stroppers, Wellington Mfg. Co., Genuine Turkey Emery, Bramwell Mfg. Co., Patent Corn Popper, Hill's, Patent Nut Cracker.

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New Diamond Step. Forged from Norway iron bars.

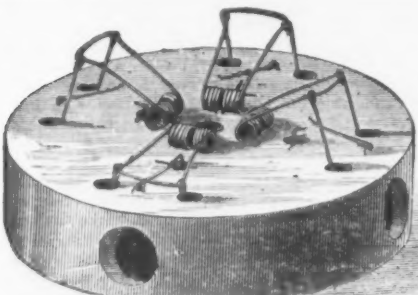
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"Superior in Every Respect."

This is one of the best-selling Locks in the market, and affords the dealer a large profit. It is thoroughly and strongly made-of the best material-very handsome in appearance, and every Lock is warranted. Orders solicited. Address as above.
Lock Box 1705, Bridgeport, Conn.

PRIZE MEDALLISTS:

Exhibitions of 1862, 1865, 1867, 1872, 1873, and only award and medal for Noiseless Steel Shutters at Philadelphia, 1876, and Paris, 1878.

CLARK & CO.,

Original Inventors and Sole Patentees of

Noiseless Self-Coiling Revolving
STEEL SHUTTERS,

FIRE AND BURGLAR PROOF.

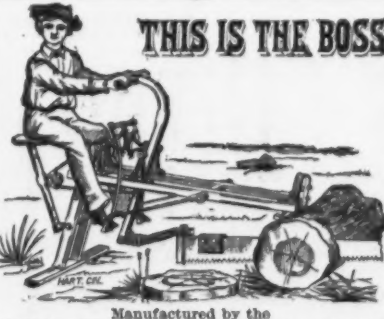
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Rolling Wood Shutters

Of various kinds. Endorsed by the Leading Architects of the World.
Send for Catalogue.

Office and Manufactory,

162 & 164 West 27th St., N. Y.



THIS IS THE BOSS

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QUEEN CITY CABINET CO., Cincinnati, Ohio.
Liberal discounts to dealers. Circulars free.



HEADS POLISHED AND LACQUERED.

THE MALLEABLE IRON
AXE WEDGE
PAT. MAR. 31, 1874.

FIFTH YEAR

since the introduction of this popular and useful little article. Sales last season larger than ever before, and this season larger still, showing that the article has real merit, and that the people want it and will buy it. Every hardware dealer or general storekeeper should have them in stock. Special terms to axe manufacturers. Having bought our stock before the recent advance in iron, we shall sell at former prices, \$4.50 per gross; one dozen by mail, 60 cents; one each size (3 sizes), 25 cents. Single sample, 10 cents. Postage prepaid.

PORTER & WOOSTER, Boston,
Formerly Am. S. & C. Iron Co.
Manufacturers and Dealers in Carriage Hardware.

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OFFICES FOR PROCURING

UNITED STATES AND FOREIGN PATENTS,

Forrest Buildings,

119 SOUTH FOURTH ST., PHILADELPHIA
AND MARBLE BUILDINGS

605 Seventh St. (Opposite U. S. Patent Office),
Washington, D. C.

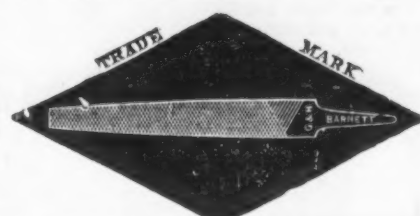
H. HOWSON, Solicitor of Patents. C. HOWSON, Attorney at Law.

Communications should be addressed to the
PRINCIPAL OFFICES, PHILADELPHIA.

PATENTS.

THOMAS D. STETSON, 23 Murray St., N. Y.,
Patent Solicitor and Expert.

Black Diamond File Works.



Awarded by Jurors of Centennial Exposition, 1876, for
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Manufacturer of HAND CUT FILES.

Warranted CAST STEEL. 187 Tenth Street, Williamsburgh, New York.
All descriptions of Files made to order. Price List mailed on application. Established 1863.

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MANUFACTURERS OF

Wrought Iron Butts, Hinges

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DOOR BOLTS,

Plain, Japanned, Bronzed and Plated.

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HARDWARE MANUFACTURERS' AGENTS, as follows:

Lawrence Curry Comb Co., Curry Combs, Howard Bros. & Co., Cotton, Wool and Curry Cards, Thompson, Derby & Co., Scythe Snaths, Osego Fork Mills, Steel Forks, Rakes, Hoes, &c., H. Knickerbocker, Scythes, Axes and Tools, H. W. Kipp, Nail Hammers, Kroman, Fork & Co., Vices, Picks, Mattocks, Grub Hoes, &c., Jacobus & Nimsick Mfg. Co., Locks, &c., Sandusky Tool Co., Planes and Planes' runs, Geo. M. Eddy & Co., Measuring Tapes, Wheeling Hinge Co., Hinges and Wrought Butts, Northwestern Horse Nail Co., Horse Nails, A. G. Coe & Co., Coe's Genuine Screw Wrenches, F. K. Silby, Emery Cloth, Holroyd & Co., Stocks & Dies, Sedgwick Mfg. Co., Butter and Flour Triers, etc., Ripley Mfg. Co., Mouse Traps, Sam'l Loring, Plymouth Tack & Rivet Works, Carr, Crawley & Devlin, Miscellaneous Hardware & Cast Butts, J. Mallinson, Cast Steel Shears and Scissors, Ketchum's Pat. Metallic Sieves, W. D. Turner & Co., Geneva Hand Fluters, D. B. Niles & Son, Hand and Sleigh Belts, C. B. Osborne & Co., Compasses, Calipers, Dividers, &c., C. W. Maguire, Brushes, Clark Bros. & Co., Carriage Bolts, &c., Laverre & Tucker, the Genuine Knox Fluting Machine, T. B. Barclay, "Dodge's" Kentucky Cow Bells, Lane Bros., Swift's and Grocers' Coffee Mills and Measuring Faucets, &c., T. C. Richards Hardware Co., Bright Wire Goods, Picture Nails, &c.

THE AMERICAN MACHINE CO.,

Manufacturers of

HARDWARE SPECIALTIES.

Office and Factory:

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SPECIALTIES: Fluting Machines, Hand Fluters, Fluting Machines, Christmas Tree Holders, Bickford Portable Pump, Mrs. Potts' Patent Cold-Handle "Crown" Irons, &c., &c.

COXE BROS. & CO.,

Cross Creek Lehigh Coal.

The Purity and Strength of this Coal especially adapt it for the working of Iron and Metals.

GENERAL OFFICE, 12 & 14 Trinity Building, 111 Broadway, New York.

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E. B. & S. W. ELY, Agents, P. O. Box 262, N. Y.

Morse Twist Drill and Machine Co.,

NEW BEDFORD, MASS., Sole Manufacturers of

Morse Patent Straight-Lip Increase Twist Drill,

Beach's Patent Self-Centering Chuck, Solid and Shell Reamers.

BIT STOCK DRILLS,

Drills for Coes, Worcester, Hunter and other Hand Drill

Presses, Beach's Patent Self-Centering Chucks, Center

and Adjustable Drill Chucks, Solid and Shell Reamers.

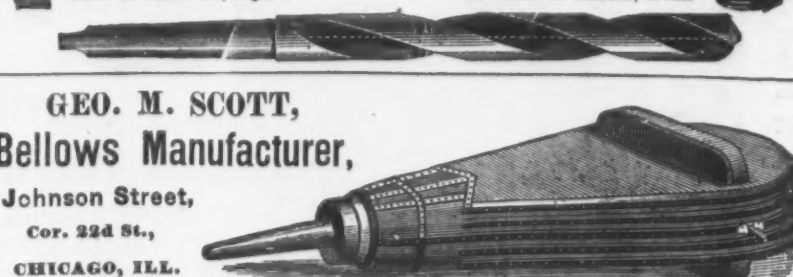
Drill Grinding Machines. Taper Reamers, Mill-

ing Cutters and Special tools to order.

All Tools exact to Whitworth Standard Gauges.

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TACKS, NAILS & RIVETS.

Shoe Nails, Shoe Tacks, Hungarian and Hob Nails, &c.

New York Salesroom, 116 Chambers Street.

AMERICAN TACK CO., Fairhaven, Mass.

A. FIELD & SONS,

TAUNTON, MASS.,

MANUFACTURERS OF

AMERICAN AND FRENCH WIRE NAILS, TACKS, SHOE NAILS, And Every Variety of Small Nails.

Offices & Factories at Taunton, Mass.

Warehouse at 78 Chambers St., New York,

where may be found a full assortment of Tacks, Brads, Wire Nails, &c., for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above-named goods made from sample to order.

A SILVER MEDAL has been awarded above goods at the Paris Exposition, being the only medal awarded any American manufacturer of Tacks and Wire Nails.

VALUABLE MANUFACTURING SITES TO LET.

The Dundee Water Power and Land Company, OF PASSAIC, NEW JERSEY.

Offer to manufacturers one of the most desirable situations for the establishment of manufacturing industries in the United States, on most favorable terms.



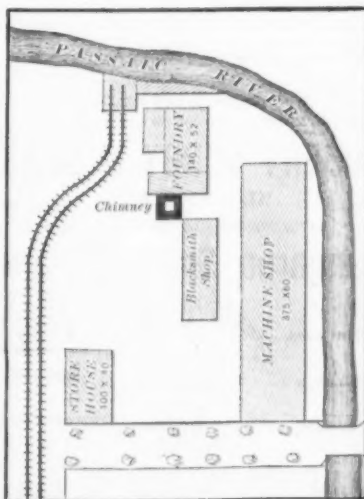
Map showing advantageous location of Passaic, N. J., as a manufacturing center.

The property of this company is located at Passaic, New Jersey, at the head of navigation of the Passaic River, only 12 miles from New York and 4 miles from Paterson. It is located directly on the line of the Erie Railroad. By means of a dam and canal, both constructed in the most permanent manner, the entire water power of the Passaic River is conducted to the company's mill sites, by which is obtained a fall of twenty-two feet. Competition by both river and rail insures the lowest rates of freight transportation, and the close proximity of several large manufacturing cities, viz.: New York, Paterson and Newark, secures a great advantage in respect to labor. There is at present in operation a dozen manufacturing establishments, giving employment to a large number of hands. The location is perfectly healthy, cost of living is cheap, and there are good churches and excellent schools. Cheap illuminating gas and healthy city water are also to be had. The permanency of the mill water power is assured. The water is delivered to each mill through a canal 80 feet wide.

Among the manufacturing establishments at present located on this property are the New York Steam Engine Co., Rittenhouse Manf. Co., woolen mill; Messrs. Waterhouse Brothers; Bosch & Sons, both woollens and hosiery; Reid & Barry, Passaic Print Works.

The establishment of the New York Steam Engine Co. is now for sale owing to a dislocation of the company. The works comprise eight substantial one and two-story brick buildings, and consist of Manufacturing Shop, 75 feet by 60 feet; Foundry, 120 by 52 feet; Pattern Shop, 100 by 40 feet; Shop, 80 by 40 feet; Brass Foundry and Boiler Rooms, of about 50 by 50 feet each, together with additional smaller buildings, called the Power House, for 75-horse power turbine, and the Fire Engine House. These works are located directly on the Passaic River, with good depth of water. In every respect this location is particularly desirable for manufacturing purposes. Liberal terms will be made by the company with desirable parties. Full information will be furnished by mail or personally by application to

JOHN B. PUTNEY,
Sec'y D. W. P. & L. Co., PASSAIC, N. J.



Plan of the works of the New York Steam Engine Co., offered for sale.

Hoisting Machinery MANUFACTURED BY CRANE BROTHERS MFG. CO., Chicago.

STAR LOCK WORKS.

ESTABLISHED 1836.

Trunk Locks, Door Springs,
Pad Locks, Trunk Stays,
Dead Latches, Keys, &c., &c.
110 South 5th St., and Sansom, bet. 8th
and 9th, PHILADELPHIA.



PATENTED
Scand. Pad Locks.
With Flat Keys.
Shackle secured to
the Lock Box.

HILLEBRAND & WOLF.
CLOTHES WRINGERS.



T. J. ALEXANDER, Manager,
BOSTON, MASS.

W. R. OSTRANDER,
Manufacturer of
PATENTED

Speaking Tube Whistles,
Bell Hangers' Hardware.

Send for revised catalogue.
20 Ann Street, New York.

THE ANSONIA CORRUGATED STOVE PLATFORM. With Patented O. G. Border.

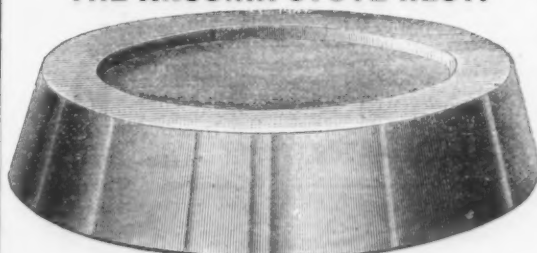
ROUND ZINC.

27, 30, 32, 34, 36 inch.



Cut Showing Round Platform.

THE ANSONIA STOVE REST.



This Cut is the Actual Size of 2-inch.

STOVE RESTS are designed to place under the feet of Stoves and Ranges, for the purpose of raising them from the floor or platform. They are about 3/4-inch thick, covered with sheet metal in zinc, brass and nickel plate. Highly polished and finished. Packed one set of 4 pieces in each paper box, and 36 sets in each case. Sizes (inside of circle on top)
2, 2 1/2, 2 3/4, 3 1/2 inch.
Send for full Description and Prices.

ANSONIA BRASS AND COPPER CO., 19 Cliff St., New York.

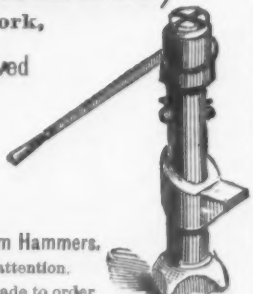
RICHARD DUDGEON,

No. 24 Columbia Street, New York,

Maker and Patentee of the Improved

Hydraulic Jacks

Punches.



Roller Tube Expanders and Direct Acting Steam Hammers.
Communications by letter will receive prompt attention.
Jacks for pressing on Car Wheels or Crank Pins made to order.

PUTNAM NAIL

It is drawn down to a point from the rod, thus:

It is the only Hot Forged and Hammer Pointed Horse Shoe Nail, made by machinery, in the World.

Some other manufacturers claim to make a hot forged Nail, but you will observe on all such a sheared edge near the point.

P. O. Address, Neponset, Mass., U. S. A.

THE PUTNAM NAIL CO., Boston.

INDUSTRIAL ITEMS.

MAINE.

The Katahdin Furnace was relined in October to 10x50 feet; a new 150-horse-power wheel was added. A new roasting kiln for ore and coal kilns will be built in the spring, when the capacity of the furnace will be increased to 140 tons a week. The furnace is now making a first-class car wheel iron.

NEW HAMPSHIRE.

C. E. Marston, of Dover, has just finished a new building for a machine shop in connection with his foundry, and has just begun to receive the tools. He will make a specialty of pulleys, shafting, hangers, &c., and do a general jobbing business.

MASSACHUSETTS.

The Vittrified Wheel Company, of Westfield, have invented a new cutting wheel made of "corundum," which is said to be nearly as hard as diamond and much harder than emery.

The Putnam Nail Company elected the following directors: John S. Fogg, W. W. Whitmarsh, John H. Buttrick, John Mears, C. C. Blanchard, W. S. Packer and E. F. White. At a subsequent meeting of the directors, B. F. White was chosen president, John S. Fogg, vice-president; W. W. Whitmarsh, treasurer, and John Mears, secretary, and the following executive committee: B. F. White, J. H. Buttrick and J. S. Fogg.

The Hinkley Locomotive Works, on Albany street, Boston, together with wharf property, machinery, stock on hand and all other assets of the company, were sold at auction by order of the trustees on Wednesday, Jan. 14. Alexander H. Porter, agent, was the purchaser. The price was \$201,000 over two mortgages of \$180,000 and the tax for 1879.

The Bay State Iron Works at South Boston are running their plate and puddle mills day and night. Their output during the last month was about 1500 tons of plates, of which about 150 tons was steel, rolled for the Norway Iron Works.

CONNECTICUT.

The Chapinville furnace has been burned and the stack destroyed. This leaves virtually but eight furnaces in the Salisbury Region of Connecticut.

Collinsville, it is said, is to erect a furnace for the manufacture of charcoal iron. —Connecticut News.

The Stewart Machine Company of New York have leased the screw company building on Sheldon street, and will take possession June 1, and employ a large number of hands. The Pratt & Whitney Company are building 60 knitting machines for the Shaw Stocking Company of Lowell, Mass., and also file cutting machines for a new company in Providence. A. F. Cushman is driving his works in making lathes and drill chucks. A new drill chuck with several important improvements is now being made. Peter Amerman is making a large boiler for the tug boat Farragut, besides being very busy on job-work, and boilers for the Baxter engine. —Hartford Courant.

NEW YORK.

The Carthage (C. C.) Furnace was recently banked for three weeks, the roads being so bad it was impossible to get coal to the furnace. They have burnt 150,000 bushels of coal and as much more is under way.

PENNSYLVANIA.

Mr. J. C. Fuller, President of the Pine Grove Furnace Company, has ordered an advance of wages averaging 12 1/2 per cent., to take effect on Feb. 1. This is the second advance made without solicitation of the employees since Oct. 1, and increases their earnings since that time 20 per cent.

The Altoona Tribune says that the first cut nails made in Central Pennsylvania were manufactured over fifty years ago by Robert McNamara, in Newry, Blair County. The same paper says that sixty years ago nails were made in Alexandria, Huntingdon County.

The new muck mill of the Potts Bros. Iron Company (Limited) is in operation, five double puddling furnaces and three heating furnaces running double turn. The firm make a specialty of skelp and boiler tube iron, on both of which they are running full. Their first or original works were erected in 1845 and '46 by Henry Potts, of Pottstown, and David Potts, of Warwick, Chester County, who were associated together under the firm name of Henry Potts & Co., and were the first and for a long while the only iron works in Pottstown. The old mill stood until some few years ago, when the old buildings were torn down and new ones put up by the Potts Brothers, into whose possession the works had passed. About a year ago a limited stock company was formed, consisting of the following members: Henry Potts, Jr.; George H. Potts, Henry W. Potts and Joseph D. Potts. These gentlemen finding that the old works were too small, concluded upon the erection of a large addition to the old mill and the putting up of three more double puddling furnaces, a new engine, squeezer and roll train. With the new works in operation, the firm will give employment to from 125 to 150 persons.

The mill at Greenville, Pa., is on double turn in all departments, and running to its fullest capacity, with splendid prospects for a long and steady run.

The Harrisburg Patriot learns that another important furnace, known as the Porter or Price Furnace, has been bought by parties who are now busy making preparations to put it in blast. We also learn that they have made a very extensive purchase of iron ore lands and leases in the Cumberland Valley from the Messrs. Ahl.

The E. & G. Brooke Iron Company, at Birdsboro, has been incorporated. It consists of the estate of Edward Brooke, deceased, with George Brooke, and with George L. Harrison, Heister Clymer and George F. Baer. The capital of the corporation is \$600,000, and it takes all the real estate, mines, mineral rights (35 properties, consisting of furnaces, rolling mill, nail factory, machine shops, foundry, ore machinery and ore lands valued at \$600,000), of the old firm of E. & G. Brooke.

The Moselem Furnace has just blown out, this being the third time in two years and a

half. The occasion was a scaffold, and the firm thought it best to blow out rather than experiment. But little damage was done, the in-wall being good. The repairs will be in the bosh. The furnace will blow at an early date.

The Chester Steel Castings Co. have doubled the capacity of their works at Chester, by extending their main building and adding to it an L, 60 x 80. They are now filling large orders for steel castings from all parts of the country.

The Lehigh Valley Emery Wheel Co., Weissport, are busier this season than they have been for four years.

The Lehigh Stove and Manufacturing Co., of Lehighton, is running with a larger force of hands than for a number of years.

A capitalist of Mauch Chunk is negotiating for the purchase of the Fort Allen Rolling Mill, of Weissport. If the purchase is consummated, the new proprietor will double the capacity of the works, and will put them in operation at an early day.

Miner Bros.' Foundry, at Weissport, is running to its fullest capacity. They employ about 60 hands. Their work consists chiefly of light castings, such as sewing machines and water-closet work.

Both furnaces of the Spearman Iron Co., at Sharpesville, are now in blast. These furnaces make an extra quality of iron that always commands an advance over the quotations of the Pittsburgh market.

The Frankstown Furnace is out of blast for repairs. It will blow in again about the first of March.

One of the Kemble Furnaces is in blast, the other is out, but is being got ready to blow.

George W. Smith, of Pittsburgh, proprietor of the Lower Maria Forge and Sarah Furnace properties, proposes to erect a new furnace on the Lower Maria Forge property, at or near Roman Furnace, early in the spring, or as soon as the weather will permit.

Nearly 50 men are employed at the new tank works of the Reading Iron Works. It is expected that nine tanks will be turned out each week.

The Camden Tool and Pipe Works, a part of the Reading Iron Works, are now in operation in all departments. The tool works have never been entirely idle, but the pipe works have been idle for two and a-half years.

The Edge Hill Furnace is ready to blow in. H. M. North has sold his Kauffman furnace property—the Cordelia blast furnace and farm land in West Hempfield, and the Figgery ore bank, in York county—to Isaac McHose, a prominent and leading iron man of Reading. It will be run by Mr. McHose, who has had a thorough experience in the furnace business, in connection with other parties, and will be in blast shortly. Mr. McHose will be general manager and treasurer of the company, the name of which has not been decided upon.

In relining the Erie Blast Furnace, it was made 65 x 13 1/2 feet, with 6 feet hearth.

Out of the nine furnaces at Sharpesville, five are in blast.

Six of the seven furnaces in New Castle are now in blast.

The scale works of Riehle Bros., Philadelphia, have been running until 9 o'clock every evening, having large orders for beams and other weighing apparatus for the custom house at the chief cities throughout the country. They are in receipt of an order for a testing machine of 150,000 lbs. capacity, for the Bethlehem Iron Company, a new design with all the latest improvements. They report also a great demand for their patent self-adjusting railroad track scales and furnace charging scales.

One of the Glamorgan Furnaces has just blown out for a new hearth.

Messrs. Hunter & Springer are constructing a new cold-blast charcoal furnace at Chambersburg, which will be in blast about May 1. It will be 40 feet high and 9 feet boshes.

Every furnace in the Lehigh Valley will soon be in operation. But six were idle January 1.

The Allentown Rolling Mill Company, of Allentown, have leased the Glen Rolling Mill, at Allentown, which will be run chiefly on puddled iron. The mill, when repaired, will have eight double puddling furnaces. This will enable the company to meet the increasing demand for light rails and other specialties, which for some time past has been beyond their capacity.

Messrs. Edward Samuel & Co., of Philadelphia, have recently issued a neat pocket pamphlet containing printed information, with illustrations, relative to railway materials, which is valuable to civil engineers and others engaged in railway construction.

PITTSBURGH AND VICINITY.

James McNeil & Bro., of the Vulcan Boiler Works, are soon to have built an addition to their works which, when completed, will double the present capacity. The proposed building is to be 120x50 feet. They will put in new boilers and engines and some additional machinery.

The old shops of the Pennsylvania railroad at Swissvale are to be put in good shape and started up in a short time under a new management. The works have been idle for some time.

It is said some parties from Pittsburgh are considering the propriety of purchasing some lots in Blairsville, having in view the erection of novelty works.

Messrs. Park, Long & Co. are making additions to their machinery that will nearly double their capacity.

The hoe factory at Monongahela City is under roof, and the machinery will be placed in position as soon as possible.

Wilson, Walker & Co., of the Union Forge and Iron Mills, have lately added a 2000-pound helve hammer to their forge department. An addition 72x47 feet is being built for a new 3000-pound steam upright hammer, with the blacksmiths' fires necessary to work the product.

It is rumored that Graff, Bennett & Co. have bought the old Rough Run Furnace property, up Buffalo creek, near Freeport, and will immediately put it in operation. This furnace has not been in operation since the days of the Pennsylvania canal, over twenty years ago.

The product of the "A" furnace of the

Cutlery.

FRIEDMANN & LAUTERJUNG,



Manufacturers of
PEN AND POCKET CUTLERY,
Solid Steel Scissors, Shears, Razors, &c.

Sole proprietors of the renowned full concave
"ELECTRIC RAZORS,"
And the celebrated "ELECTRIC SHEARS." Nickel Plated
Bows.

Agents for the BENGAL RAZORS.
AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &c.
91 Chambers and 73 Reade Sts., N. Y. 423 N. Fifth St., ST. LOUIS, MO.

MERIDEN CUTLERY COMPANY.

THE "PATENT IVORY" HANDLE TABLE KNIFE.

It is the oldest manufacturer of Table Cutlery in America. Exclusive makers of the CELLULOID HANDLE
for Table Cutlery. A most beautiful and perfect substitute for Ivory. Also makers of all kinds of TABLE,
BUTCHER AND HUNTING KNIVES. Illustrated catalogues with prices sent to the trade on application.
No. 49 Chambers Street, New York.

THE
LAMSON & GOODNOW
88
CHAMBERS ST.
MFG. CO.
N.Y.
GARDNER'S PATENT
AMERICAN TABLE
CUTLERY & C.

EXTRA HEAVILY PLATED

Spoons, Forks, Knives, Etc.



The only survivor of the four Rogers; recognized by the Supreme Court of this State in the test
trial vs. C. Parker.

WM. ROGERS, Wallingford, Conn.

Formerly of Hartford and West Meriden. With SIMPSON, HALL MILLER & CO.



AARON BURKINSHAW,
Manufacturer of Pen and Pocket Cutlery, Pepperell, Mass. Established 1853.
My Blades are forged by hand from the best Cast Steel, and warranted. To me was awarded the Gold
Medal of the Conn. State Agricultural Society.

HENRY SEYMOUR CUTLERY CO.
Manufacturers of Full Nickel Plated and Maroon Japan Handle
SHEARS AND SCISSORS.
Every pair warranted. Sold by Hardware Dealers throughout the country.
Salesrooms, 84 & 86 Chambers Street, New York City. Manufactory, HOLYOKE, MASS.

The Celebrated VICTOR Cast Shear
SOLD HARDWARE NOTION DEALERS EVERYWHERE. Special Attention given to orders for export.

THE VICTOR LAMP TRIMMERS
The best in the Market.
Manufactured by THE RENZ HARDWARE CO. Bridgeport, Conn. U.S.A.
Send for List and Discounts.

STANLEY RULE AND LEVEL CO.,

MANUFACTURERS OF

Improved
Carpenters'
Tools.

No. 113, Improved Adjustable Circular Plane - \$4.00

Penfield Block Works,
LOCKPORT, N. Y.,
Wrought Iron and Wood Shell
TACKLE BLOCKS.

All Steel Roller Bushings, and Roller Bushed
Iron Heaves.
CARPENTER MALLETS
Of every description.
Giant Car Pusher and Faucets.

Send for Catalogue.

IRON AND BRASS WOOD SCREWS.

We manufacture a
IRON AND BRASS SCREWS.
Quality, finish and tests as to strength, guaranteed equal to any
in the market.
With improved facilities and largely increased capacity for
production, we can fill orders promptly, and invite inquiries for
discounts.

Philadelphia Screw Co., Limited,
Twelfth and Buttonwood Streets,
PHILADELPHIA.

Cutlery.

ALFRED H. HILDICK,
19 Warren St., N. Y.,
Importer of CHAINS, ANVILS, VISES, &c.
Agency of
HILL BROTHERS & CO., WALSALL, ENGLAND
GENERAL HARDWARE MERCHANTS,
And of
BALL'S PAT. SOLID STEEL SHEEP SHEARS.
These shears are unsurpassed for cheapness, durability
and utility. They are made of one solid piece
of steel from point to point, and cannot be broken in
use either in the bow or at the junction of the shank
and blade. Samples can be seen at above address, or
sample lots furnished.

CORPORATE MARK,
* * *

Joseph Rodgers & Sons'
(LIMITED)

CELEBRATED CUTLERY,
No. 52 Chambers Street, New York.

F. & W. CLATWORTHY, Agents.

The demand for Joseph Rodgers & Sons'
productions having considerably increased, they
have, in order to meet it, greatly extended their
Manufacturing Premises and Steam power.

To distinguish Articles of Joseph Rodgers
& Sons' Manufacture, please to see that they bear
their Corporate Mark.

P. O. Box 996. ESTABLISHED 1836.

Alfred Field & Co.,
COMMISSION MERCHANTS,

New York, Birmingham, Sheffield, Liverpool.

Guns and Pocket Cutlery,
SPECIALTIES.

Headquarters for
ELEY'S BROS.' GOODS, WRIGHT'S ANVILS,
WILSON'S BUTCHER KNIVES, &c.
WOSTENHOLM'S POCKET CUTLERY AND RAZORS.
BUTCHER'S FILES, TOOLS AND RAZORS.
STUBS' FILES, WESTERN FILES,
GREAVER'S SHEEP SHEARS,
CHESTERMAN'S TAPES,
GERMAN COIL AND HALTERS and other CHAINS.
BRADSHAW'S TOWELS AND HOES.
CANASTOTA KNIFE CO.'S POCKET KNIVES.
Etc., Etc., Etc., Etc.

All sorts of Hardware and Merchandise for im-
port and export purchased on commission.

ROBERT SORBY & SONS,
SHEFFIELD,

MANUFACTURERS OF THE CELEBRATED

Kangaroo Sheep Shears,

The best Every
Shears Shears
made. Guaranteed.

ALFRED FIELD & CO.,
93 Chambers St., - NEW YORK,

SOLE AGENTS.
Send for price list and terms.

Cutlery.

McCOY & CO.,
IMPORTERS OF

Hardware, Cutlery, &c.

SOLE AGENTS FOR

THEILE & QUACK'S

CELEBRATED

Pocket Knives and
Scissors.

A large stock of

Muzzle & Breech Loading
English Guns.

132 DUANE ST.,
NEW YORK.

Silver Medal, 1878-Paris.



J. R. SPENCER & SON,
Albion Steel Works, Sheffield,

MANUFACTURERS OF

FILES

AND

STEEL,
Table Knives, Razors, Shovels, &c., &c.,
of every description.

CORPORATE MARK.

SPENCER
SHEFFIELD

Granted 1749.

SCHRODER LOCK CO.,
Manufacturers of

BUILDERS' HARDWARE,
Locks, Latches,
HINGES,

AND
BRONZE & BRASS GOODS
Of all kinds.

JAIL LOCKS.
Office and Works,
16 & 18 East 7th Street,
CINCINNATI, OHIO.

A liberal discount to the
trade.

PHENIX CASTER CO.,

Indianapolis, Ind.

Send for Illustrated Catalogue.



Shipped as nuts and bolts, at very low rate of freight.

Painted
Vermillion
Red.
Tucker's Incomparable
ADJUSTABLE
STOVE TRUCK.
Packed
One Dozen
In a box.

Patented,
Feb. 18, 1879.
Oct. 1, 1879.
July 1, 1879.

Eight thousand sold the first year.
TUCKER & DORSEY, Mfrs.,
Indianapolis, Ind.

LIGHTNING
STUMP PULLER,
M. E. BUNGER & Co.,
Manufacturers,
Indianapolis, Ind.

Observe what absolute
power—prying up on
one chain and down
on the other.
Fulcrum 1 1/2 inch
on short bit.
Fulcrum length-
ened at pleasure
at stump gives
easy, this addi-
tion is needed as
desired.

Send for
Illustrated
Circular and
Prices.

We make TILL either for
Cotton or Strip.

Simple, Cheap,
Light.

Durable, short hitch,
adapted to strength
of Horse.

Frederick's 3-Horse Equalizer is a perfect Double Tree, a perfect Tripple Tree, a perfect 2-Horse
Stretcher, a perfect 3-Horse Stretcher, a perfect attachment for either 2 or 3 horses anywhere. Just the thing
for spring plowing. Send for illustrated circular.
M. E. BUNGER & CO., Indianapolis, Ind., Manufacturers.

A. G. COES
PAT. DEC. 26, 1871.

Established in 1839.

A. G. COES & CO.

WORCESTER,
MASS.,

Successors to

L. & A. G. Coes,

Manufacturers of

THE GENUINE

COES

Screw

Wrenches.

PATENTED,

May 9, 1871.

December 20, 1871.

December 28, 1875

August 1, 1876.

The backstrain when the wrench is used is borne
by the bar—not by the handle.

The strongest Wrench made, and the only suc-
cessful Re-enforced Bar.

None genuine unless stamped

A. G. COES & CO.,

Our Agents, GRAHAM & HAINES, 113 Chambers St.,
New York, carry a full line of our goods, and will be
pleased to serve you at factory prices.

Day, Farrington & Co.,

Manufacturers of and Dealers in

LOCKSMITHS' AND BELLHANGERS'
SUPPLIES.

Locks, Knobs, Night Latches, Gongs, Blank Keys,
Wrought Store Door and
Flush Bolts.

Electro and Hand Silver Platers, Hand-Plated
Name, Number and Pew Plates.

Office, 295 Third Avenue, NEW YORK.

Factory, Brooklyn, E. D.

SUPERIOR QUALITY

North Carolina Mica.

We are prepared to furnish

Stove Manufacturers,
Oil Stove Manufacturers,
Jobbers and Retail Dealers,

WITH
MICA

of very best quality.

Estimates furnished on application.

J. S. & M. PECKHAM, Utica, N. Y.,

Miners and Wholesale Dealers in Mica.

CLARK'S RUBBER WHEELS.

This wheel is the
best now in the
market, and is at-
tracting the atten-
tion of large manu-
facturers on ac-
count of the great
saving of floors,
which is ten times
greater than the
extra cost of this
wheel.

Adapted to all purposes, viz., Warehouse trucks,
platform trucks, scales, boxes, baskets and heavy
casters. For full particulars see the first issue of The
Iron Age next month, or address

GEO. P. CLARK, Windsor Locks, Conn.

GEO. M. EDDY & CO.,
Manufacturers of

Measuring Tapes
Of Cotton, Linen & Steel.

FOR ALL PURPOSES.
25' to 353' Classon Ave. Brooklyn, N. Y.

JAMES COMLY,
4739 Paul St., Frankford, Philadelphia Pa.,
Manufacturers of

Hardware Novelties,
Glass Cutters, &c.

CHARLES E. LITTLE,
59 Fulton St., New York,
Agency for Barnes' Foot-Power Machinery.

Velocipede Scroll Saws, No. 1, \$12.00; No. 2, \$15.00;
No. 3 (new one), \$15.00; for fine fret work. "Veloci-
pede Scroll Saw, with seat, No. 2, \$25.00; and "Large"
Saw, \$25.00; both for light and heavy carpenter use.
Mortising and Molding Machines, each, \$25.00. Com-
bined Circular and Scroll Saws, \$20.00; with boring
attachment, \$25.00; Hand Circular Rip Saw, \$20.00; for
heavy work. Lathe, \$25.00; \$20.00. Sixty-four
page catalogue, description of above, given on appli-
cation. One hundred page catalogue now in print.

WM. ROGERS & SON, AA, Superior Electro Silver-Plated Table Ware.



WM. ROGERS,
Senior Member and Manager of ROGERS BROTHERS.
On Knives.



F. WILLSON ROGERS,
Son of the late Wm. Rogers.
On Hollow Ware.



Our Knives are guaranteed to strip 12 dwts. of Silver per Dozen. All goods are put up ONE DOZEN IN A BOX. All our Knives are put up in the latest and most attractive style, with guarantee card in every box.

WM. ROGERS & SON, A. A.

Our Spoons, Forks, etc., are guaranteed to strip On Tea Spoons, 48 dwts. per gross. On Dessert Spoons and Forks, . . . 72 dwts. per gross. On Table Spoons and Medium Forks, 96 dwts. per gross. ALL OTHER GOODS IN PROPORTION. All our Spoons, Forks, etc., are plated upon 18 PER CENT. NICKEL SILVER, The best base known for plating upon.



Our Hollow Ware is plated upon the FINEST WHITE METAL, and is guaranteed to be plated fully 50 PER CENT. More Silver than any other brand of goods in the market.

P. O. Address, Drawer 30.

WM. ROGERS & SON, Hartford, Conn.
Depot, No. 100 Chambers Street, New York.

HALL, ELTON & CO., Electro Plated Ware, German Silver and Britannia Spoons.



THE "EASTLAKE." (Patented.)

Factories, Wallingford, Conn.

Salesroom, 75 Chambers Street, New York.



FORKS, SPOONS, Etc.,
Manufactured from Cast Steel, Plated with Nickel and Silver.

WALLACE BROTHERS, Wallingford, Conn.

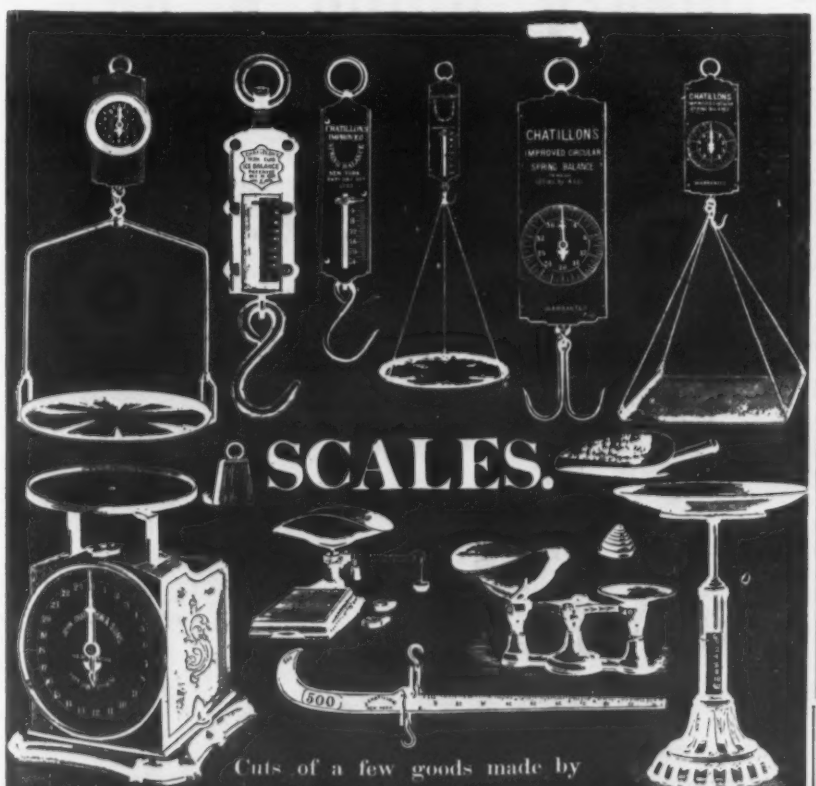
THE HOWE SCALE CO., Improved Scales & Weighing Machines of every Variety.

OFFICES:

PRIEST, PAGE & CO., 325 Broadway, New York. BORDEN, SELLECK & CO., 97 Lake Street, Chicago.
PRIEST, PAGE & CO., 145 Franklin Street, Boston. J. FRED. DENNIS, 16 Holborn Viaduct, London.
Works at Rutland, Vt.



Four Pointed Steel Barbed Cable Fence Wire,
Manufactured by H. B. SCUTT & CO., Buffalo, N. Y.
(See Monthly Iron Age.)



Cuts of a few goods made by

JOHN CHATILLON & SONS, NEW YORK, U.S.A.

WESTON DYNAMO-ELECTRIC MACHINE

NICKEL.

The rapid increase in the use of Nickel-Plating owing to the introduction of the Weston Machine and the very low price of nickel material, enables us to give greatly reduced estimates for complete outfits.

Outfits complete, with Dynamo-Electric Machine Tanks, Anodes, Solution, &c., &c., \$250. We beg to refer to the following Stove Manufacturers among 500 other houses using the Weston Machine: Richardson & Boynton, S. S. Jewett & Co., Fuller, Warren & Co., Perry & Co., Detroit Stove Works, Michigan Stove Co., Co-operative Stove Co., E. & C. Gurney, Hamilton & Toronto, and many others.

INFRINGEMENTS. We call attention to infringers of the Weston Machine, in which Automatic Switches are used to prevent change of current. The Weston Co. are owners of patent of all forms of Automatic Switches for Plating Machines. The adoption of these machines will certainly lead to great loss to parties purchasing or using them.

CONDIT, HANSON & VAN WINKLE
Sole Agents NEWARK, N.J., U.S.A.

ENGLISH AGENCY: 18 Caroline Street, Birmingham.



Romer & Co.
Established 1837.

Manufacturers of Patent Scandinavian or Jail Locks, Brass Pad Locks for Railroads and Switches. Also Patent Stationary R. R. Car Door Locks, Patent Piano and Sewing Machine Locks. 41 to 45 Railroad Avenue, NEWARK, N. J. Illustrated Catalogue sent to the trade on application.

Edgar Thomson Steel Company (Limited) has steadily increased since it was first blown in, and is now 75 tons a day No. 1 Bessemer. This is ten tons more than the estimated capacity of the furnace. The ores used are Spanish, Lake Superior and Pilot Knob. B furnace is being got ready as fast as possible, and will shortly be in blast.

The old Vesuvius Mill at Sharpsburg is again in operation, after having been idle since August 20, 1878.

The Crescent Tube Works are running both butt and lap weld mills until midnight to fill orders.

MARYLAND.

Locust Grove Charcoal Furnace and Bowery Coke Furnace are both preparing to go in blast.

All of the Baltimore furnaces are reported to have no iron on hand and sold ahead.

VIRGINIA.

"Pennsylvania parties," says the Richmond Dispatch, "have bought the Arcadia Iron Works, lying on the west slope of the Blue Ridge, extending down the river from the town of Buchanan some 10 miles, and running back to near the Peaks of Otter. It contains about 20,000 acres in fee simple, and ore rights in about 4,000 acres additional. It has on it a hot-blast charcoal furnace, immense bodies of wood land, and large deposits of valuable iron ores. The purchasers have already begun the opening of mines."

It is reported that the Walton, Cedar Run, Sinking Creek, Salisbury, and Amherst furnaces are preparing to go in blast at once; some during the present month.

The Tredegar Iron Company, Richmond, are working their mills to their full capacity. So are the Old Dominion Iron and Nail Works Company. Messrs. W. E. Tanner & Co., founders and machinists, have enlarged their works, and have recently purchased \$10,000 to \$12,000 worth of new tools, and are working on an order to their full capacity. Talbott & Sons have largely increased the capacity of their buildings, and added some very expensive tools to their equipment.

The Richmond Daily Dispatch, in its statistics of the manufacturing in that city, places the number of establishments at 565, employing 14,193 hands. The value of tools and machinery is stated to be \$2,392,981, the real estate \$4,429,921, the sales of manufactured goods \$23,486,640.

Every furnace in Virginia is selling its product as soon as it is made.

The Callie Furnace only waits the completion of its connecting railroad, built on furnace account, to blow in. This connection will be reached in a short time.

The new furnace at Low Moor will be ready to blow in some time in May.

OHIO.

The Iron and Steel Company's furnace and rolling mill, Ironton, were sold on the 15th at trustees' sale to a company composed of Geo. F. and S. J. Stone, of New York, and J. H. Bramwell, of Virginia, for \$100,000. It will be immediately repaired, and the company expect to be making iron in 30 days.

We are authorized to contradict the statement to the effect that the Laughlin Nail Mill, Martins' Ferry, has increased its number of puddling furnaces recently by ten.

The Akron Iron Co.'s mill is running double turn in all departments and adding two new puddling furnaces, which will start as soon as they can be gotten ready.

The Howard furnace, Hanging Rock, is getting ready for a blast this year.

Simpson & Gault, manufacturers of the "Fearless" wringers, report very heavy sales of wringers during the past season. They have just completed three heavy shipments—one to London, one to Paris and the other to San Francisco. Business has already opened with them in the way of several large orders for the spring trade, one of which calls for 275 dozen wringers. Their business in mill supplies has more than doubled in the past year.

From the Cleveland Herald's report of the receipts and shipments at this point during 1879, the following figures are taken: Receipts of coal, 1,600,000 tons; shipments, 700,000 tons. Receipts of iron ore, 530,000 tons.

The Youngstown News of a late issue thus speaks of the industries of that neighborhood. The Youngstown Rolling Mills are running with their usual regularity in all branches of their trade. Arms & Wick, at their mill in Smoky Hollow, have been making full time, with the exception of a short delay in making needed repairs. The blast furnaces in this city and vicinity are all in, and, unless some accident occurs, there is no probability of their being blown out. A large force of men are rapidly putting the necessary timbers in shape for the building of the large stock house for the Himrod Furnace Company. Cartwright, McCurdy & Co. are running double time in all their departments. A breakdown in their fan-blower recently caused a slight stoppage, with the exception of which they have lost no time for months. William Tod & Co. are pressed with orders for new-work, and large amounts of repairs on mills and furnaces.

Of the 16 coal and coke furnaces in the Hanging Rock region, at least seven are in blast; three are either wrecked or of little value; one is burned, and will probably not blow in at present; two will blow in February, and another very soon. One that is out was blown out on account of the flooding of its coal mine.

From present appearances it will be nip and tuck with the stonecoal furnaces to get enough ore to keep them hot this year. The ore is plenty in the hill, but getting it out is the thing.—Ironton Register.

The Hecla Furnace is making more metal than ever before, some days running to 14 tons. This is the latter half of the second year on the present hearth, which probably accounts for the increased production. She will run another year yet on the present hearth.

The production of pig metal in this county in 1879 was 49,900 tons, as follows:

Hecla	3,000	Mount Vernon	3,000
Buckhorn	1,200	Pinegrove	3,400
Alice	5,500	Washington	3,000
Monitor	1,500	Olive	2,500
Lawrence	3,000	Belfont	12,700
Grant	2,400		
Sarah	8,000	Total	49,900

The production in 1878 was 34,900, showing an increase of 15,000 tons in 1879. All the furnaces were in blast during the year except the Center, Etna, Vesuvius, and Iron and Steel. Of these four it is now certain that two will go in blast this year, and probably three, so that 1880 will see all but one of the furnaces in this county in full operation. The Belfont Mill ran 278 days during 1879. In that time the product was 209,738 kegs of nails, for the manufacture of which 29,333 tons of coal were consumed. While the mill was in operation the company gave employment to 675 men and boys, including those at the furnace, coal banks, ore mines and keg factory. During 1879 the Lawrence Mill ran 290 days, of which time 170 days were double turn. The product of the year was 8000 tons of merchant bar, hoop, wire, &c., for the production of which 30,250 tons of coal were used. During the time the mill was at work it gave employment to 450 men, including those at the coal banks.—Ironton Register.

TENNESSEE.

Mr. S. B. Lowe, Chattanooga, dealer in metals, &c., has completed the opening of six ore banks, and has contracted to furnish about 50,000 tons of ore to various furnace companies.

The Clarke and the LaGrange furnaces have been purchased by a new company. The LaGrange Furnace has been torn down and is being rebuilt in modern style. It will have a capacity of about 25 tons per day.

GEORGIA.

The Cherokee Iron Company are preparing to build another stack at Cedartown.

One of the Barton furnaces will blow in soon.

The Pool Furnace, which has been out of blast for three years, will be changed so as to run on coke.

KENTUCKY.

The Center and Red River furnaces are preparing to go into blast.

ILLINOIS.

Of the 12 blast furnaces in Illinois, but four are in blast—those in Chicago. Of the four the Big Muddy Furnace will blow about March 30. The two Grand Tower furnaces and the Illinois furnaces are not likely to blow in. The two Joliet furnaces and the two Mein furnaces will blow in shortly to make pig iron for the Joliet Steel Co. The Mein furnaces will be blown by the Missouri Furnace Co.

MICHIGAN.

The Michigan furnaces are reported as being all sold up, and what iron is on hand is there for want of means of transportation. The furnace of the Spring Lake Iron Co., now nearly completed, will be put in blast about the 1st of March.

MISSOURI.

The iron trade of St. Louis for the year 1879 shows an increase of about 150 per cent. over the previous year, while the prospects are for a much larger increase the coming year. Machinery dealers, hardware jobbers and dealers in all branches of the iron trade report sales the past year over 100 per cent. in advance of the previous one, and the new year bids fair to show a still largely increased trade.—St. Louis Journal of Commerce.

The Groom Shovel Company have been reorganized and the machinery again put in motion, with the capacity considerably enlarged. They are prepared now to turn out 12,000 dozens of shovels annually.

Of the eight stonecoal furnaces of this State, four are in blast and four out. Those in blast are the two Missouri furnaces and the two South St. Louis furnaces, all four being blown by the Missouri Company. The Jupiter and the three Vulcan furnaces will be blown by the Vulcan Steel Company about the 1st of February.

Of the ten charcoal furnaces of Missouri but two are in blast, viz., the Midland and the Scotia. Of the others, seven will probably not blow this year. The others will blow in in March or April.

MINING AND MINERAL ITEMS.

IRON.

Ten acres of iron-ore property near Flourtown, Springfield Township, Montgomery County, Pa., have been sold to the Warwick Iron Company, Pottstown, for \$11,500. The ore is hematite of a good quality and has been successfully used by the Warwick Company.

A Cleveland iron firm has closed with the proprietor of the Baldwin Iron Mine, in Ottawa County, Ontario, for a large quantity of ore. Work at the mines will be begun at once, and shipments will be made during the season by rail. The opening of the mines will give employment to a large number of men.

A new vein of iron ore has been struck on the land of James F. Kline, of Orefield, Lehigh County, Pa., which is said to be unusually rich. The ordinary 5-ton cars, with the usual loads, turn the scale at 5½ tons. The Thomas Iron Company are getting the ore. The vein stands in solid walls, is 60 feet under ground and a black earth covers it, which is said to be a good mineral paint.

Wm. Rowe and his son, Wm. G. Rowe, of Reading, and George Geiss, of Alburts, have opened and are working a vein of primitive iron ore near Vera Cruz, Lehigh County, Pa., near the Perkiomen Railroad. It is on the same formation as the Zionsville mines, which are 1½ miles distant. The shaft has reached the depth of 40 to 50 feet, and the ore, which yields some 50 to 55 per cent., is being taken out in paying quantities.

At the new mine opened near Macungie by C. N. Bryan, of Doylestown, operations have been delayed for want of hands; 500 or 600 tons of ore are lying on the bank.

The old iron-ore beds throughout Clarion County, Pa., are receiving attention, and where convenient to railroads, will be worked and the ore shipped to other points.

A valuable bed of iron ore was recently opened on the land of Charles Foulk, near Farmington, Pa., on the line of the Catawauqua and Fogelsville Railroad. The ore was discovered near the surface, and is said to be first-class hematite. Mining operations

H. D. SMITH & CO.,

Plantville, Conn.,

Manufacturers of the

BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

SARANAC HORSE NAIL CO.

Polished or Blued Horse Nails, Hammered and Finished.

The Saranac Nails are hammered hot and the finishing and pointing are done cold. Quality is fully guaranteed. For sale by all leading iron and hardware houses.

S. P. BOWEN, President and Treasurer.

J. W. LYNDE, Secretary.

PLATTSBURG, N. Y.

STERLING & CO., Agents, 7 and 9 Cliff Street, New York.

METALLIC AMMUNITION,
Rim and Central Fire, all Sizes.

GUN WADS, Black and Pink Edge,
Guaranteed Superior to any Imported.

THE UNION METALLIC CARTRIDGE COMPANY,

BRIDGEPORT, CONN.



PRICE LISTS WITH DISCOUNTS TO THE JOBBING TRADE ON APPLICATION.

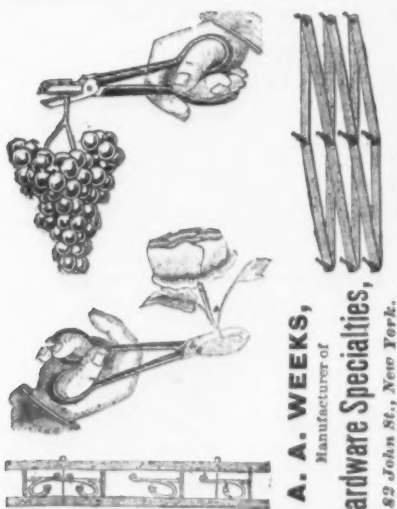
PERCUSSION CAPS.

F. C. Trimmed Edge, W. Proof.
F. L. Ground Edge, W. Proof, Foil Lined, equal to any imported.
D. W. P. Ground Edge, W. Proof, Central Fire, equal to any imported.
Musket, Paper and Tin Boxes.
Berdan, Orcutt and Wesson Primers.
Bullet Breech Caps.

PAPER and BRASS SHOT SHELLS.

PAPER.
Celebrated "U. M. C." Sizes, 8, 10, 12, 14, 16, 20, Central Fire.
BRASS.
Berdan, Solid Anvil. Sturtevant, Movable Anvil. Buffington, Movable Anvil.
Berdan Primer.
Kenney's Patent Indentation to prevent Wads from starting.

Agents: **HARTLEY & GRAHAM, New York.**



FARLEY'S PATENT
Rubber-Cushioned Casting Brush.



Manufactured and for sale in the
L. B. FLANDERS MACHINE WORKS,
1025 Hamilton St., Philadelphia
Descriptive Circular on application.



Bemis & Call Hardware & Tool Co.
PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.

For Circulars and Price List, address

BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass.



See our advertisement in The Iron Age first issue of each month.

Beardsley Scythe Co.,
Manufacturers of
GRASS, GRAIN & BUSH SCYTHES,
Hay Knives & Corn Knives,
West Winsted, Conn.

EAGLE FACING MILLS AND PLUMBAGO WORKS,

CINCINNATI, O.,

Foundry Facings and Blackings, Black Lead and Lubricating Plumbago.

Foundry Supplies, Monk's Molders' Tools, Molding Sands.

Our Return Facings are used by all first-class Stove Manufacturers. Our Heavy Blackings are used by the U. S. Government, by the leading Railroad Foundries, and wherever heavy castings are made.

QUALITY GUARANTEED THE BEST. SEND FOR PRICES.
S. OBERMAYER & CO., Props.

HUSSEY, BINNS & CO.,



PITTSBURGH.

SHOVELS,
SPADES and
SCOOPS.

PATENT

ANTI-WINDOW

RATTLER,

FOR

Dwellings, Cars, Steamboats, &c.



The Anti-Window Rattler supplies a long needed want; it is so simple in construction that it can be used on any window, and so complete that it will prevent the slightest shaking, no matter how great the jar or how old the sash. As shown in cut, it consists of a rubber wheel in a nickel-plated or brass frame; is ornamental as well as useful, and does not interfere with raising or lowering the sash.

HEATON & DENCKLA,
General Agents,
507 Commerce St., Philadelphia.

GRAHAM & HAINES,
Agents,
113 Chambers St., New York.

OTIS D. DANA,
Agent,
26 to 32 Pearl St., Boston, Mass.

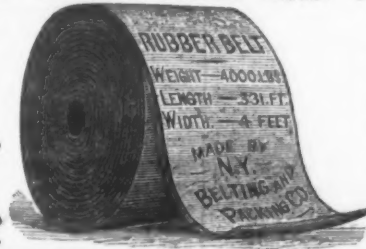
Vulcanized Rubber Fabrics

ADAPTED TO

MECHANICAL PURPOSES.

RUBBER BELTING and PACKING.

Machine Belting,
Steam Packing,
Leading Hose,
Suction Hose,
Grain Elevator
Belting,
Steam Hose,
Piston-Rod
Packing,
Gaskets and Rings.



Vacuum Pump
Valves,
Ball Valves,
Car Springs,
Wagon Springs,
Gas Tubing,
Machine Belting,
Wringing Rolls,
Billiard Cushions,
Grain Drill Tubes,
Emery Wheels.

This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham Elevators at Chicago, which have been running perfectly for more than Twelve Years, also those for Armour, Dole & Co., Chicago, and Vanderbilt's great elevators of the New York Central and Hudson R. R., New York, being the largest belts in the world. We are now making an Elevator Belt, 36 inches wide and 500 feet in length, which will weigh over 15,000 pounds.

LINEN and COTTON HOSE.

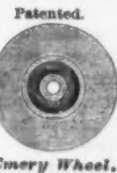


Plain and Rubber Lined.

Circular Woven-Seamless Antiseptic RUBBER LINED "CABLE" HOSE and "TEST" HOSE, Vulcanized Para Rubber and Carbolized Duck, for the use of Steam and Hand Fire Engines, Force Pumps, Mills, Factories, Steamers, Ships, Hospitals, &c.



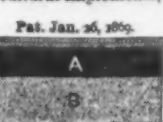
Emery Wheels and Packing.



ORIGINAL Solid Vulcanite EMERY WHEELS

LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.

The properties of these Wheels are such that they can be used with great advantage and economy for cutting, grinding, and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Marble, Glass, etc. These Wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools, Plows, Saws, Stoves, Fire Arms, Wagon Springs, Axles, Skates, Agricultural Implements, and small Machinery of almost every description.



PATENT ELASTIC Rubber Back Square Packing

BEST IN THE WORLD.

For Packing the Piston Rods and Valve Stems of Steam Engines & Pumps.

B represents that part of the packing which, when in use, is in contact with the Piston rod. A the elastic back, which keeps the part B against the rod with sufficient pressure to be steam tight, and yet creates but little friction.

This Packing is made in lengths of about 30 feet, and of all sizes from 1/4 to 2 inches square.

Corrugated Rubber Mats and Matting.



For Halls, Flooring, Stone and Iron Stairways, &c.

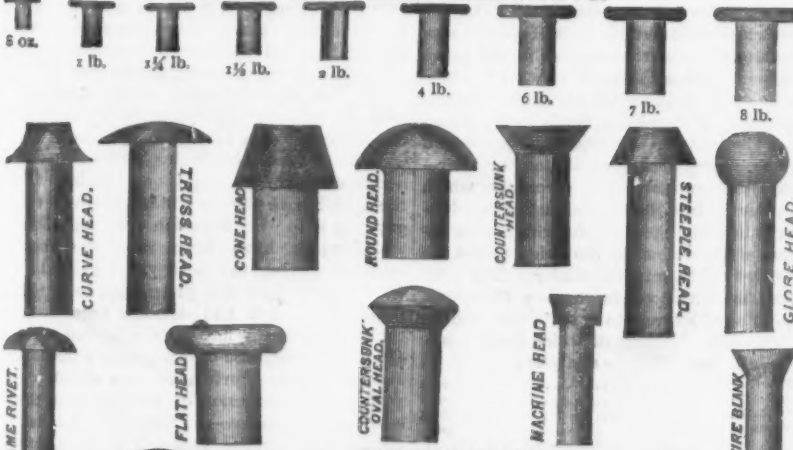
This practical and indispensable article—especially for wear where exposed to ice, snow, or slush—was first introduced by this company several years ago, and its real value is in being almost indestructible, when proper materials are used in its manufacture, whilst the cheap, inferior quality forced on the public by reckless imitators of our patent goods soon becomes brittle and crumbles to pieces. Address



NEW YORK BELTING & PACKING CO.,
Warehouse, 37 and 38 Park Row, New York.

JOHN H. CHEEVER, Treasurer.

BLACK AND TINNED IRON RIVETS.



W. P. TOWNSEND & CO.,

PITTSBURGH PA.,

Manufacturers of every description of First Quality

RIVETS.

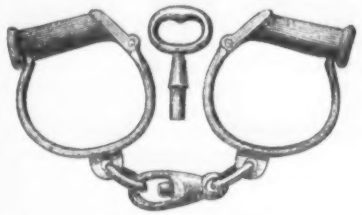
[See advertisement in The Iron Age of January 1, 1880.]

WHEELER & MELICK CO.,
ALBANY, NEW YORK, U. S. A.,
Manufacturers of

IMPROVED FARM IMPLEMENTS
AND MACHINERY.

PROVIDENCE TOOL CO.

Providence, New York, Boston, Chicago.



Wrist & Ankle Shackles,

REVERSIBLE

ICE AND FLOOR SCRAPERS,

MADE BY

PROVIDENCE TOOL CO.,

Providence, R. I.

The advantage of this Scraper is that each cutting edge can be changed as fast as worn, and present a new and sharp-cutting edge. Thus the Scraper can be used and the whole blade made available. It is especially useful in cleaning ice from sidewalks. Price, \$9 per doz.



FRANKLIN S. MILES,

Brass, Iron, Steel and German Silver

SCREWS, 205 Quarry Street, Philadelphia.

N. Y. MALLET and HANDLE WORKS



Manufacturers of
Calkers', Carpenters', Stone Cutters',
Tin, Copper and Boiler Makers' MALLETS,

Hawking Beeties, Hawking and Calking Irons: also all kinds of Handles, Sledge, Chisel and Hammer Handles. Also
COTTON and RALE HOOKS.
Patented Feb. 13, 1877; a new combination of Hooks.
456 E. Houston St., New York City.

THE FAR-FAMED
AMERICAN LUBRICATOR
AMERICAN LUBRICATOR CO.
DETROIT, MICH. U.S.A.

have already been commenced, the owner having contracted with Mr. Henry Bengold for working the bed.

COAL.

The steel rope used in hoisting cars on Mahanoy Plane, in the anthracite region, costs \$5672, and is used only for 2,000,000 tons. The one now in use will be taken off after a service of seven months.

It is anticipated that the product of the Schuylkill region next year will reach 9,000,000 tons, of which the Coal and Iron Company will supply at least one-half, and from the facilities now on hand and others that will be available during the year, it will be in a position to increase its output fully up to the extra demands made upon it. At the Merriam Colliery, where a tunnel nearly 1300 feet long has been driven to the Mammoth, the coal in the cut is 19 feet 7 inches, and is in splendid condition. In addition to other acquisitions previously noted, the company has recently taken possession of the Tunnel Ridge Colliery at Mahanoy City, and after some needed repairs will start operations. At Tunnel and Keystone Collieries new lifts are being sunk, and these works will be again in operation during the season. Altogether the prospect both for the operators and the miners and laborers is very encouraging—much more so, we may say, than it has been at the beginning of any previous year within the last decade.

Hard coal has been found at a depth of 25 feet, 12 miles northeast of Emerson, Winnepeg, Manitoba.

Some idea of the importance of water as an element in the cost of mining coal may be had from the statement recently made before the courts in the case of Sanderson against the Pennsylvania Coal Company, at Scranton, where it was asserted that in the Gipsy Grove Colliery, which mined about 100,000 tons of coal a year, the amount of water pumped during the same time reached a million tons, or ten tons of water for every ton of coal. A Mr. Post made the further statement that there were more tons of water pumped from the Diamond Colliery than tons of coal mined in the entire Lackawanna District.

Col. A. J. Hill, of Fayette County, Pa., has sold his extensive coal field near Connellsville, on a royalty, to Mr. Rainey, of Cleveland, Ohio. This is said to be one of the best bodies of coal in the Connellsville basin. It is situated on the west side of the Youghiogheny river, four miles below Connellsville, and to operate it necessitates the bridging of the river, work upon which will be commenced immediately. It is said that the daily receipts of Col. Hill, under his contract with Mr. Rainey, will amount to \$100 a day. His father, A. M. Hill, was one of the pioneers of the Connellsville coke trade.

The statement is denied that there is a freight pool existing between the Lake Erie, B. & O. and Pennsylvania lines, the pool only including the one item of coke. Mr. Tom Scott, Jr., is the secretary of this pool, and reports the business to the High Joint Commission, a board of railroad men who act as umpires over any question which may arise. The average is 600 cars of coke per diem, and how the business is divided has never been made public.

Men have begun the work of putting the coke ovens at New Castle, Pa., and the machinery in condition for immediate operation.

Prominent among the capitalists who have the ovens is S. D. Oliphant, of Pardo, Mercer County; his brother, Hughes Oliphant, and a gentleman from Pittsburgh.

Charles A. Armstrong & Son have leased the Catt's Run Coke Works, located on the Monongahela River, below New Geneva, and will commence business as soon as they can make the necessary repairs.

Interchangeable Bolts and Nuts.

A subject of much importance to manufacturers, car builders, tap and die makers and rolling mill proprietors was again discussed at length at a recent meeting of the master car builders, the topic being: "The standard system of screw threads, and the best method of maintaining exact sizes of screws so that bolts and nuts may be interchangeable." Mr. Wm. Sellers, who was present by invitation, argued that the difficulty experienced by master car builders did not appear to have its origin in the Franklin Institute standard system, but that it appeared to resolve into this: How can it be ascertained what is a correct inch or quarter-inch or half-inch? It would not make any difference if all adopted the Sellers' standards of measurement, or if all adopted any of the standards and were satisfied to work to that particular one.

When he proposed this system of screw threads, he supposed that everybody would make his own taps and dies as heretofore, and it was his hope that an interchangeable system would result, because everybody would make his own in the easiest and simplest way. Sellers & Co. continued to make their own taps and dies for a long while, but, in process of time, manufacturers of the standard taps and dies grew up in the country, and they found that it was cheaper to buy than it was to make them themselves; they insisted, however, upon having them right by their standard. When they did not come right by that standard, they were rejected; but they have never experienced any difficulty in procuring taps and dies that would make interchangeable work. And this brought Mr. Sellers to suggest that as the manufacturers of taps and dies have grown up in the country when the demand for their work was sufficient, so at this time the making of gauges is established—only very recently—perhaps within a year or two. It is a very difficult thing to make a gauge that will be right; in fact, it is impossible to make one that will be so nearly right that no error can be detected in it. But there are practical limits within which it is possible to work commercially, and within which interchangeable work can be attained; and if gauges can be made with this degree of accuracy, they would answer the purpose, so that practically their differences would amount to nothing. The parties interested in this matter ought to make it to the interest of the gauge manufacturer to produce a set of standard measures which all could accept as such, because the trouble does not appear to lie with the system of screw threads. No difficulty seems to exist there. The diffi-

culty is the original one of what is an inch, and until that has been settled it is worth while to discuss the forms of threads—whether they shall have flat tops and flat bottoms, or round tops and round bottoms. The difficulty would exist, and they would not be interchangeable unless an agreement could be reached as to what should be the standard, and what variation from that standard should be permissible.

Early in their endeavor to establish a system of standard threads that would interchange, Messrs. Sellers & Co. were frequently asked to make taps of a larger size than the standard, the complaint being that so much of the iron was cut away as to destroy the value of the bolt. Now, that was perfectly true. If a half-inch and a thirty-second was taken for a half-inch, or three-quarters and a thirty-second for a three-quarter inch bolt, and then cut to the standard size, a thirty-second of an inch will certainly be cut away unnecessarily for the purpose of making a screw thread. The difficulty exists because almost all iron is rolled to full size. They had the same difficulty in establishing standards for shafting many years ago. They found that one-sixteenth of an inch was sufficient to turn to their standards—that is to say, if the iron was 2 inches and no more, they could make good work. If it was less than 2 inches, they had difficulty. They required, therefore, that the mills making their orders should make the iron measure what it purported to be, and for a time had difficulty in obtaining it. After a time, however, that difficulty disappeared, and there is little doubt that there will be no difficulty in getting bolt iron to standard sizes if the public who use it insist upon it.

It is scarcely worth while to have a difference of one thirty-second of an inch in bolts that purport to be one half inch or five-eighths, or three-quarters; in fact, it would be a positive nuisance to have such various sizes, because to assort them they must be measured. The difference between a three-quarter and a five-eighth inch bolt is evident at sight, and the sizes ought to vary enough to be detectable by the eye. The only excuse for such minute variations that can be offered is that the iron, as it now comes from the mills, is almost always over size, and can be remedied whenever it is really desired that it be corrected.

Mr. Sellers believed that all the bolts and nuts used by car builders would be interchangeable if the taps were measured by taking the outside diameter, the diameter at the root of the teeth, the angle of the thread and the pitch. He did not think that the matter would be much helped by having a gauge to screw the work into, and argued that if it is soft it will wear out very rapidly; and if it is hardened, the chances will be that it will not be right. Mr. Stetson, superintendent of the Morse Twist Drill Co., and Mr. Grant, representing Messrs. Pratt & Whitney, did not appear to agree with him on the latter point. Mr. Grant stating that hardened steel gauges could be made by processes recently perfected which gave both a true angle of the thread and a correct pitch, adding, however, that they were expensive, although not so much so that they could not be used in all railroad shops.

GLASS ITEMS.

Nearly every table ware factory in Pittsburgh is preparing new styles of ware for the spring trade.

The lamp chimney trade is in good condition, the factories being well employed and sales good.

The Pottery and Glassware Reporter says: Work on the new gas furnace at McKee & Bro.'s factory, Southside, Pittsburgh, is progressing very rapidly. Mr. Nicholson promising to have fire in it within a few weeks. In the meantime the old furnaces are doing extraordinary work. The latest great feat in glass making is the getting of 64 pots of glass in one week from the two furnaces of ten pots each. The best week's work ever done when the three furnaces were in operation was the melting of 75 pots. Great improvements have been introduced in the mold shop, by adding a drill press, a lathe and a planer.

The glass works of A. T. Servin at Lenox Furnace (the old Lenox Plate Glass Works, Mass.) have again started up on rough plate, after a suspension of two years or more.

The glass factory of Messrs. R. C. Schmertz & Co., at Bellevue, Pa., is in active operation, making about 275 boxes of glass daily. The firm gives employment to 335 skilled workmen.

The property of the Cape Cod Glass Factory, at Sandwich, Mass., was recently sold at sheriff's sale for \$725, to C. C. P. Waterman, the former clerk and paymaster. It has been in operation since 1867.

Gillinder & Sons, manufacturers of glass table ware, lamps and lamp chimneys, have the largest glass factory in Philadelphia. They have 400 hands in their employ, and are very busy.

It is singular, but nevertheless a fact, that foreign manufacturers control nearly the entire American trade in argand chimneys. The only concern in Pittsburgh now making chimneys of this description is the Fort Pitt.

R. C. Schmertz & Co. will operate window glass works at Columbus, Ohio, which have been idle for six years past. This firm now have 26 pots at Belle Vernon, 10 pots at Brownsville and will have 10 at Columbus, making 46 pots in operation.

The Eagle Glass Works at Renta, Iowa, which were erected in 1829, have a building, 55x104, in which is a large 7-foot furnace 18 feet in diameter. They have five shops, three of which are blow shops and two press shops. They employ 60 hands, and work some overtime. Their location is on the Okaloosa branch of the Chicago, Rock Island and Pacific Railroad. The sand used is from their own county and from Pacific, Mo. Forty miles west is a rich coal field, from which they procure coal and coke.

Mr. Charles M. DuPuy has just received, through Dr. Knight, the bronze medal awarded him for his exhibit at the Paris Exposition. This exhibit consisted of iron and steel in various shapes, made direct from the ore. It attracted much attention from the novel and simple method of using ores to secure the result shown.

The Iron Age

Metallurgical Review.

New York, Thursday, January 22, 1880.

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JAMES C. EAYLES . . . Editor.
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We are likely to have throughout the West this spring a "mud embargo" very similar to that which locked the wheels of trade for so many weeks last year. These frequent—we may almost say annual—interruptions to trade, resulting from the impassable condition of country roads between winter and summer, are very serious matters. They cut off communication between country and town, prevent the farmer from hauling his produce to the railroads, make wheeling of all kinds almost an impossibility, and entail an annual cost for wear and tear of horse-flesh, which it would be difficult to estimate in dollars. In view of these facts, it is not evident that some of the enterprise of which the people of the West boast so much, and with such good reason, should be directed to the building of highways which will be passable at all times, and over which the heavy haulage of farm produce can be conducted at any season with the least cost and trouble? In our eagerness to build railroads we have, to a great extent, forgotten the importance of good highways, which contribute in an important degree to the prosperity of any locality which is provided with them. The value of the horses annually ruined, in a given neighborhood, in hauling loads through the rivers of mud and sloughs of mire which, from force of habit, we call roads, would pay for such improvements as would

give us good highways wherever they are needed, and the numerous incidental benefits therefrom resulting would more than pay for their maintenance in good order.

Progress of Metallurgy in 1879.

As in all branches of metallurgical technology, improvements upon existing processes have been developed with such vigor, so earnestly and so systematically, that a close watch must be maintained by all interested in order to keep up with the times, and, if possible, to detect the direction in which modern progress is tending. The time is past when an ironmaster could rest content with having learned, by fair means or otherwise, exactly what his neighbors were doing. Text books, formerly approximately reflecting the state of the art, even ten years after their publication, can no longer be made to keep pace with practice, so that those desiring to obtain information must look to the transactions of scientific bodies and to the technical press for the data enabling them to judge what is doing. Protected, at least in part, by the patent laws now adopted in almost all civilized countries, inventors find it to their interest to promptly place before the public the results of their labors. This circumstance and a number of others tending in the same direction have, of late years, contributed to a free and very liberal interchange of experience between metallurgists of all countries, making the science truly international. This imposes upon those interested the duty of watching progress not alone in their own country. The proceedings of the Iron and Steel Institute, of the American Institute of Mining Engineers, and of kindred societies in France, Belgium, Austria, Germany and Sweden are carefully read, and reports of the experiments conducted or the processes adopted in the works of each country are studied with much interest. This feature of modern metallurgy has been especially noticeable during the year just closed, a year which will be memorable as one of intense and universal excitement, and therefore we assume that a brief review of its eventful history and a summary of the present status of the most important improvements, judged from the published results, will be welcome to the readers of *The Iron Age*.

The great and all-absorbing event of the year was the announcement that Messrs. Thomas, Gilchrist and Snelus had succeeded in producing steel, low in phosphorus, from pig containing so high an amount of that deleterious element that it could not be used for the manufacture even of rail steel by the Bessemer process. We have kept the readers of *The Iron Age* well informed as to the successive steps by which one obstacle after the other has been removed, and must refer for details to the files during the year just closed. Like all great revolutions in applied science, the recent improvements are the outgrowth of a long series of experiments and researches, in which many conscientious and able workers took part; and while great credit is due to those who finally mastered the situation, it should not be forgotten that much of the information which was correctly interpreted by them, was gathered with much labor and considerable expense by such metallurgists as Bell and others. Messrs. Thomas, Gilchrist and Snelus, recognizing the drawbacks and weak points of earlier experiments, clearly saw that, in order to prevent a reduction of the phosphoric acid carried into the cinder during the blow of a Bessemer charge by the most powerful reducing agent present, silica, it would be necessary to reduce the amount of the latter body. The sources from which the silica present was derived in the Bessemer process were two-fold. A portion of that carried into the cinder was dissolved out of the lining, which was until then invariably made of ganister—almost pure silica; another part was obtained by the combustion of the silicon contained in the pig introduced. The first source might be cut off by making the lining of some substance which, while it would prove sufficiently refractory to withstand the high temperatures of the Bessemer process, must be capable also of resisting the abrasive action caused by the violent commotion of the metal and the chemical reactions in the vessel. The substance chosen was magnesite, lime, which they found would furnish bricks fit, in every respect, for the purpose required if burned at very high temperatures. The entire satisfaction which this material gave in all the experiments made, leaves no doubt as to the durability of the new material, so that in this respect the new process is acknowledged by all to be perfect. Messrs. Thomas and Gilchrist took a step in advance of their present associates, Messrs. Snelus and Riley, attempting to neutralize the effect of the silica produced by the combustion of the silicon of the pig by the addition of a flux composed of a mixture of lime and iron ore, in such proportions that the percentage of silica in the cinder did not exceed a maximum of 12 per cent. This was naturally done also with a view to preventing the rapid wear of the lime lining by the chemical action of the cinder. Various theories were formulated and ably defended in regard to the probable chemical reaction taking place under these altered circumstances in the Bessemer converter. We have dwelt upon them fully in former issues of *The Iron Age*, and need only point out one essential feature characterizing the new process. It was found that the greater bulk of the phos-

phorus still remained in the metal after all the carbon and silicon had been eliminated. The process—which, under ordinary circumstances, is interrupted at this period—had to be continued until the total elimination of the phosphorus was assured. This period—called the after-blow—was regarded with grave suspicion by many able metallurgists, who feared that it would give rise to excessive waste, and would call for the addition of greater amounts of spiegelisen or ferromanganese, in order to introduce the proper amount of carbon into the metal before pouring it into molds. As the effect of additions rich in carbon was to again reduce a portion of the phosphoric acid, already safely taken up by the cinder, and drive some phosphorus back into the metal, it was naturally desirable that the duration of the after-blow be reduced as far as possible. Another point of weakness of the process appeared to be that the amount of silicon in the pig treated could only be allowed to vary within narrow limits. It was urged that those working the process were beset on either side by two dangers. If, on the one hand, the amount of silicon were allowed to go too low, the quantity of basic fluxes required would, it is true, be considerably reduced, but then the whole blow would be so cold as to lead to the formation of skulls and create trouble in casting. The actual occurrence of cold charges during the earlier experiments justified these apprehensions. On the other hand, it was pointed out with much force that if the percentage of silicon in the pig be allowed to go too high, the blow would be unnecessarily extended as regards the time, and the bulk of the basic additions required to neutralize the large amount of silica formed, would prove a very serious obstacle to its commercial success. These doubts were to a great extent met by the results of a series of experiments made by the inventors and their chief backers, Messrs. Bolckow, Vaughan & Co., and notably the chief engineer of the latter company, Mr. Windsor E. Richards. They made strong and well-directed efforts to decrease the inconveniences of the after-blow period, and were very successful in reducing the violent commotion caused by the generation of carbonic oxide by the addition of spiegel, and in avoiding the reduction of phosphoric acid at the close of the process by previously adding a quantity of highly siliceous iron. In order to prevent the wearing of the bottom, they introduced with much success the blowing in of lime by means of blast. An additional feature, shown by later trials, was that the use of iron ore in the mixture of fluxes originally added might be entirely discarded, lime alone being used as an addition during the process, iron ore having the effect of running down the temperature. While thus the development of the new process was proceeding as rapidly as might be expected in England, and success was attained from a technical point of view, earnest and systematically planned experiments were made in Germany to reach a satisfactory solution of the best method of working the new process on a large scale. The result has been a surprising and highly remarkable one, and as it is just at the present time agitating the metallurgical world on both sides of the Atlantic, we may be permitted to enter more into detail, supplementing and enlarging upon the data already published in recent issues of *The Iron Age*.

As we have already stated in the above, it was generally believed by metallurgists that a certain percentage of silicon was necessary, in order to secure by its combustion during the blow the temperatures required to keep both the steel and the large quantities of fluxes in a liquid condition. The engineers at the Hoerde Steel Works, Germany, Messrs. Massenez and Pink, came to the conclusion early in their experiments, begun on the 22d of September, 1879; that it would be advantageous to blow pig low in silicon, but high in phosphorus, relying upon the temperature created by the combustion of the latter, to keep the steel and the cinder in sufficiently fluid condition. In this connection it may be of interest to reproduce the calculations made by Herr J. von Ehrenwerth, who, we believe, was the first to suggest and examine the idea of actually using phosphorus as the source of heat. He calculates that phosphorus in burning in air generates 4206 units of heat, while silicon develops 6523 units, so that one part of phosphorus may replace 0.654 parts of silicon, or one part of the latter can be supplanted by 1.56 parts of phosphorus. Based upon these results he has calculated the following tables, which show, all things being equal, the percentages of phosphorus necessary to replace silicon both in mottled and in white pig:

MOTTLED PIG.									
Silicon.	0.00	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00
Phosph.	3.12	2.73	2.33	1.93	1.56	1.17	0.78	0.39	0.00

WHITE PIG.									
Silicon.	0.00	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00
Phosphorus.	3.33	2.93	2.53	2.13	1.73	1.33	0.93	0.53	0.13

They began at Hoerde with pig holding:

Carbon.	3.80	to	3.34	Silicon.	1.50	to	2.85
Manganese.	1.30	to	0.65	Phosphorus.	1.30	to	1.01
Sulphur.	0.01	to	0.07				

And, finding that the blow proceeded satisfactorily, they commenced to add at first one-third, then successively one-half and two-thirds of the following metal, which was ultimately blown alone:

HOERDE WHITE MILL PIG.			
Silicon.	0.36	Manganese.	1.30
Phosphorus.	1.70	Sulphur.	0.16
Carbon.	2.30		

It will be interesting to note that these

figures agree very closely with the theoretical calculations made by Herr von Ehrenwerth. The following record of three charges, No. 67, 68 and 69, blown at Hoerde, will best serve as a valuable proof of the correctness of Herr Massenez's statements, which we will summarize further on.

CHARGE NO. 67.					
Time.	Phos.	Carbon.	Sulph.	Mang.	Silicon.
11 m. 45 s.	0.88	0.08	0.19	0.39	1.08
15 m. 25 s.	0.08	0.06	0.13	0.39	0.07
15 m. 40 s.	0.045	0.04	0.14	0.37	0.005
Steel.	0.06	0.08	0.067	0.46	0.002

Gray pig.	Lbs.	Spiegelisen.	Lbs.
White pig.	3,397		
Steel scrap.	1,108		
Steel produced.			5,806

CHARGE NO. 68.					
Time.	Phos.	Carbon.	Sulph.	Mang.	Silicon.
14 m. 05 s.	0.96	0.23	0.16	1.04	0.45
14 m. 07 s.	0.00	0.16	0.40	0.02	
15 m. 30 s.	0.09	0.085	0.15	0.33	0.003
16 m. 3 s.	0.05	0.08	0.00	0.29	0.004
Steel.	0.06	0.06	0.005	0.31	0.00

Gray pig.	Lbs.	Spiegelisen.	Lbs.
White pig.	3,397		
Steel scrap.	1,108		
Steel produced.			7,738

CHARGE NO. 69.					
Time.	Phos.	Carbon.	Sulph.	Mang.	Silicon.
12 m. 05 s.	1.04	0.23	0.27	1.37	0.72
12 m. 07 s.	0.74	0.08	0.18	0.45	0.14
14 m. 05 s.	0.07	0.18	0.18	0.18	0.004
Steel.	0.06	0.04	0.063	0.40	0.00

Gray pig.	Lbs.	Spiegelisen.	Lbs.
White pig.	3,397		
Steel scrap.	1,108		
Steel produced.			6,958

The average waste of these three charges was 10.7 per cent., the quantity of cinder produced being 4960 pounds, which contained 1.8 per cent. of the iron charged into the converter. Tests of the steel obtained by the three blows cited yielded the following results—the first column showing the tensile strength in tons per square inch; the second the elongation per cent.:

Blow No. 67.	31.81	20.6
Blow No. 68.	33.07	20.0
Blow No. 69.	34.48	19.2

Later, in November, 1879, experiments were made with Luxembourg pig, holding carbon, 3.50; silicon, 1.17; phosphorus, 2.59; sulphur, 0.15, the steel resulting from the blow running only 0.03 per cent. of phosphorus. Herr Hupfeld, an eminent Austrian engineer, reports that the percentage of phosphorus in the pig used for 54 successive blows varied between 0.8 and 2.68 per cent., while the phosphorus in the steel produced fluctuates between the limits of 0.07 and 0.035 per cent. We may add that the following are the results of twenty-eight blows, made from October 27 to November 1, as given by Herr Massenez:

CHARGED.			Lbs.			Percent.		
Hoerde foundry pig.	61,288		61,288			25.63		
Hoerde mill pig.	130,228		130,228			52.10		
Steel scrap.	36,234		36,234			75.70		
Spiegelisen.	11,240		11,240			4.87		
Ferromanganese.	150		150			0.70		
Total.	239,178		239,178			100.00		
Lime.			34,535			18.3		

The method employed is as follows: Lime alone is preheated as strongly as possible, and is charged into the converter, mixed with some fine coal and coke, and then gently blown for a short time until it is bright red, the material used being, of course, as low in silica as possible. Then the pig is run in as hot as possible, and blowing commences. Herr Hupfeld reports that in the beginning the blow shows all the phenomena of a cold charge, but after about two minutes it becomes hot, and continues so until all the silicon and carbon is eliminated, a period lasting from eight to fifteen minutes. This is followed by the after-blow, which lasts from 100 seconds to four minutes, according to the amount of phosphorus in the pig.

All accounts at hand until now agree in stating that the metal is at this time in a perfectly liquid condition—so much so, in fact, that it was possible to stop blowing six times in order to take samples, while in another case witnessed by Herr Hupfeld, seventeen minutes were consumed for the same purpose. The metal is hot enough for bottom casting, and has not given any trouble in the way of blow-holes, skulls in the ladles, &c. The bulk of the cinder is poured off before adding the spiegelisen or ferromanganese, an increase of precaution which provides against the reintroduction of phosphorus into the steel by the well-known reaction of the carbon of the spiegel upon the phosphate of lime in the cinder. The basic lining has withstood more than 100 blows. It may be of interest to note, in this connection, that the dolomite of which it was made contained, according to analysis:

Silica.	2.14
Oxide of iron alumina.	0.69
Carbonate of lime.	55.05
Carbonate of magnesia.	49.50

The impurities in the burnt brick amounted to 9.43 per cent. of silica—a comparatively high amount—and 4.13 per cent. of alumina and oxide of iron. The most unsatisfactory feature thus far has been the short duration of the bottoms stamped in the usual way with lime moistened with petroleum, their average duration being fifteen blows. No trouble is experienced at Hoerde by blowing cinder and metal out of the converter—a difficulty which, it will be remembered, forced those working at Eston to alter the converter neck in order to prevent "gobbing up." A certain amount of manganese in the pig is considered very favorable, as it renders the cinder more fusible, as

far as experiments have gone, about two-thirds of the sulphur is eliminated during the blow. We have already had occasion to allude to the fears expressed by M. Trasenster, that the question of getting rid of the sulphur may become a serious one for the producers of many grades of phosphoric pig; and we may add that a large percentage of silicon, which so often accompanies considerable quantities of phosphorus, may also debar certain classes of poor pig, unless some means are found to prepare them for the process by some simple and inexpensive means. Mr. A. M. Warner, of Middlesborough, we may add, professes to possess such a method, the details of which, however, he does not give. As for the indications showing when the after-blow is completed, Herr Massenez states that the close of the process is generally approximately known by experience, the percentage of phosphorus in a certain grade of pig being very much more uniform than that of silicon. Samples are taken once or twice; and, besides, there is one phenomenon which is characteristic of the close of the process. When the last portions of the phosphorus are being removed, fumes of burning iron and manganese indicate that those metals are beginning to be attacked.

Such are the results of the latest advances in the dephosphorization of pig iron. The developments made are surprising, to say the least, and they are so fully backed by figures and analyses that there can be no doubt as to the great and immediate importance. That the Thomas process is generally recognized as offering large advantages, may be gathered from the fact that 14 converters lined with basic brick are now working in Belgium, France, England, Germany and Austria. As yet no experiments have been made with it on this side of the Atlantic, but we are informed that the prospects of an early trial are encouraging. Whether and how far Herr von Turner's estimate of the quality of the metal produced at Hoerde and its probable use will be borne out by future experiments and researches, is a matter upon which no exact statements can now be made. Herr Massenez gives figures as to cost which show a wide margin of profit for the manufacture of steel from phosphoric pig, as compared with that made from the metal hitherto called "Bessemer pig." There is no reason to believe that the manufacture of superior grades of pig iron will suffer much, if anything, in consequence of the new aspect of the steel problem. The field for high-grade Bessemer steel made from pure pig is, on the contrary, likely to be much enlarged in the future, and may reap great and permanent advantages from the new processes. The production of special grades of Bessemer steel for cutlery, saws and innumerable other articles, has begun in England, and will probably be largely extended in the future. The prospects for the works producing wrought iron and the various shapes rolled therefrom, are of course very seriously affected by the developments of the year. It has been repeatedly stated that the solution of the problem of making good steel from poor pig would mark the beginning of a rapid decline of puddling. Temporary inability to meet the demands of commerce may, as it does at the present time, restore to the works built for the manufacture of wrought iron a short-lived and profitable activity, but there can be no doubt that during the coming decade the majority of consumers will have learned to use and appreciate the steel, or rather "ingot iron," of the present day, and then the greater number of the works operating at present will be forced to adapt themselves to existing circumstances or to go to the wall. Naturally, every locality is governed by a different set of circumstances, and will have to shape its course in accordance with them, and we have little doubt that quite a number will find that a continuation of old methods may be profitable for many years to come. But such establishments will be the exception, not the rule, and it is very necessary that all engaged in the iron industries should closely study the advance of the formidable rival now entering the field.

In this country centralization, which a more general introduction of the Bessemer process will rapidly produce abroad, is counteracted to a certain extent both by natural and artificial causes, and it remains a delicate and important question how far the open-hearth process will be able to fill the gap. It is in this direction that American metallurgists have been most earnestly working during the past year, and while their labors have not progressed so far as to permit a full and detailed account of their work, much has been achieved that gives ample promise of early and complete success. Their efforts have been chiefly directed to the extension of the range of the open-hearth process—or, rather, to the perfection of methods destined to furnish a suitable raw material for that method of manufacturing steel—and experiments have been going on for some time in that direction. As a very important trial in this respect, the experiment with the Siemens direct process at Tyrone, Pa., deserves a special mention. We regret that we are unable to place before the readers of *The Iron Age* more minute details of what has been accomplished until now. It is evident from present results, however, that the particular value of direct processes has been quite generally misunderstood, those conducting similar experiments having attempted to produce wrought iron at a

sacrifice of 40 or even 50 per cent. of the metal by oxidation. This waste is reduced to a minimum by dropping the metallic sponge produced by the direct process into the bath of the open-hearth furnace, where it is protected at once from further action by the oxygen of the furnace gases. The material made by this direct process, while it contains mechanical impurities greater than those in charcoal blooms, is chemically, so far as the metallic iron it contains is concerned, as suitable for the manufacture of high grades of steel as the blooms themselves. The cost of making it is only a fraction of the price of the material used hitherto; in fact, the probabilities are that it is hardly, if any, greater than that of pig made from the same ores. The exact figures cannot at this time be ascertained, because only one furnace is working at Tyrone, so that expense for fuel, labor, &c., is higher than it would be in current working on a larger scale. It should be noted, also, that the quantity of mechanical impurities in raw material of this class, used for the open-hearth process, does not in any way affect injuriously the quality of the metal, the impurities being carried away in the cinder produced in the open-hearth furnace. A second method of procuring for the open-hearth furnace a raw material of sufficient purity from ordinary grades of pig metal is the Krupp washing process, a full and elaborate account of which, both as regards its technical and commercial features, was given some time since by Mr. A. L. Holley, and published in full in *The Iron Age*. The Krupp process cannot by any means be considered an experiment, as more than 17,000 tons of steel have been produced by it at Essen. A Krupp washing plant is now being erected at the Cambria Works, Johnstown, at Springfield, Ill., and at the works of Messrs. Spang, Chalfant & Co., Pittsburgh, and others are in contemplation. At the Cambria Works experiments with a Perrot plant have thus far given ample encouragement. To a certain extent the manufacture is still in the experimental stage, if that term is accepted as applicable to a period in which the results obtained, though frequently fully satisfactory, do not, taking the average of long periods, fairly reach the best obtainable. At the Cambria Works we hear it is not an uncommon thing to turn out three 12-ton charges in 24 hours, starting with cold materials, a result which is fully equal to that reached abroad. The main trouble, it is said, lies with the refractory materials, made by the works themselves. While thus vigorous and well-planned efforts are made in this country, we believe that there is still much room for improvement, and we trust that American enterprise, ingenuity and originality will correctly seize the spirit of the times, and push American metallurgical methods to that advanced position which it has already held in various important departments. We may add, in this connection, that a process which in former years attracted a good deal of well-merited attention, the Henderson process, is worthy of careful attention at the hands of metallurgists and ironmasters, and that if we are correctly informed it has recently obtained the recognition for which it has been struggling so long.

British Exports of Iron, Steel and Metals.

The Board of Trade returns of the exports and imports of iron and steel for Great Britain, covering the year 1879, have just come to hand, and, as they show accurately how much material has been furnished by England to this country during the four months which have passed since the revival in the iron trade, they are valuable in correcting many erroneous statements and exaggerated estimates. The following are the amounts of iron, steel and metals shipped from English ports to the United States during the years 1877, 1878 and 1879:

	1877.	1878.	1879.
Pig iron.....	35,953	32,663	276,998
Bar, angle, bolt and rod iron.....	5,877	4,698	21,630
Railroad iron of all sorts.....	5,253	681	44,998
Hoops, sheets, boiler and armor plates.....	5,079	4,021	10,456
Tin plates.....	106,593	108,123	155,795
Cast or wrought iron and all other manufactures.....	2,413	3,194	10,403
Old iron for remanufacture.....	3,167	1,886	177,642
Steel, unwrought.....	6,263	4,905	9,305
Iron rails.....	333	304	20,820
Steel rails.....	401	.....	23,750
Lead, all sorts.....	378	1,087	.....
Copper and manufactures of.....	47	254	.....
Tin.....	659	2,250	.....
Hardware.....	\$1,407,912	\$1,568,000	.....
Machinery and mill work, not steam engines.....	659,703	843,879	.....

It will be noticed that there is in almost every item of the list a heavy increase, which is most pronounced with pig iron, railroad iron of all sorts, including iron rails, tin plates and old iron for remanufacture. Considering that in almost every branch of the metal trade, the bulk of the foreign purchases on the part of the United States has been made in England, the table given above probably presents very closely the actual importations of this country. The bulk of the pig iron sent here has been Scotch, the excess over last year's supply being 244,000 tons. It should be noted that this represents a large portion of the gain of British pig iron exports during the year, the figures for 1878 and 1879 having been, respectively, 923,080 and 1,227,624 tons. Adding together the

shipments to Germany and those to Holland, the latter receiving only in transit for the former country, we find that the amounts were 469,403 tons for 1878 and 467,936 for 1879. To both countries large shipments were sent in anticipation of the German tariff, and since the latter has gone into effect they have fallen off enormously. In bar, angle, bolt and rod iron, we again note that but for the demand from America, export business for British iron markets would have declined somewhat, and a similar state of affairs is to be noticed in the figures for railroad iron, hoops, sheets and plates, and cast or wrought iron manufactures. The striking increase of the demand for tin plates appears, according to the returns, to be confined almost entirely to this country. More than 175,000 tons of English old iron in excess of former years have been absorbed by the United States, in addition to which considerable quantities have also been drawn from other European countries. It is satisfactory to note that the bulk of the supplies obtained is in crude forms, while only the smaller portion comes in the shape of products which go directly into consumers' hands. We would call attention to the fact that the returns nowhere indicate the shipments of any considerable quantity of steel blooms, and that the whole amount of steel rails sent during the year was only 23,750 tons, a quantity ridiculously out of proportion to the huge figures which those interested on both sides of the Atlantic assumed. On the whole, we suppose that the returns will be satisfactory to our English friends. They clearly show the wholesome effect of the American demand, but do not, so far as we are able to gather from the figures for the month of December, exhibit the increase of business with other foreign countries of which so much has been said of late.

Reciprocity with Canada.

The Committee on Commerce of the House of Representatives has now under consideration a bill providing for the appointment of a Board of three Commissioners, to meet three Commissioners to be appointed from the Dominion of Canada, to confer and report, for the information of their respective governments, on the subject of the commercial relations between the two countries. This is a non-committal sort of a measure, but it means a movement in the direction of reciprocity. But were reciprocity as desirable as its advocates consider it, is it by any means certain that the Canadian government would agree to it? There was a time when they wanted it badly enough, and would have made considerable sacrifices to secure it, but since they have resolved upon a policy of protection to home industry, they will, we think, be inclined to test the experiment a little further and see what comes of it.

With regard to reciprocity with Canada, there are two things upon which the business men of this country are pretty well agreed. One is that it is desirable in itself considered, and the other is that so long as Canada remains a British colony it is wholly impracticable. The first step in the direction of a commercial union with this country which will be approved by our people, must be the severance of all ties of political union with Great Britain. It may be said that this has been already practically accomplished, and that the colonial relation which Canada bears to Great Britain is only a nominal one. Such, however, is not the fact. So long as the appointment of the Governor General is a prerogative of the British crown, and so long as a vice regal court is maintained at Ottawa, British influence will dominate Canadian politics to a much greater extent than the people of the United States would find agreeable.

This is seen in the new Canadian tariff, which, while presumably impartial and intended for the protection of domestic industry, is really so framed as to favor England at the expense of the United States. This object has been to a great extent secured, for American trade with Canada has been injured out of all proportion to the injury inflicted upon British trade with that country. With Canada as an independent nation, we could afford to negotiate for commercial reciprocity of the freest kind. Her products are largely raw materials, and there is little chance of much industrial development there under existing conditions, or, indeed, under any conditions likely to exist in a country so sparsely settled without a homogeneous population, and for geographical reasons largely dependent upon the railroad system of the United States for an outlet. Canada would be a good market for our manufactures in proportion to her population, and would supply us many classes of products which would cheapen the cost of living in this country without injury to home industry. But as a British colony, with only such rights in the matter of treaties and legislation affecting international interests as the crown may be graciously pleased to permit, the less we have to do with her in the matter of reciprocity the better. After all, Canada and not the United States needs reciprocal trade, and if we grant it, the conditions should be those of our own making, as they undoubtedly will be.

At last we have a ruling of the Supreme Court of the United States on the subject of the liability of employers for injury to workmen. The case before them was that of a railroad engineer on the

Texas and Pacific who lost his life while saving his passengers from accident, the accident being the result of a defect in his engine to which he had called the attention of the master mechanic. His widow sued the railroad, but was ruled out in Texas. The United States Supreme Court held that the employers must not expose their employees to perils which can be guarded against, and if the servant reports defective or unsafe machinery, the master becomes responsible if the repair or restoration is not promptly made. The doctrine, familiar to English courts, but never hitherto adopted here, that the acts of a superior officer or workman under a corporation are as those of the employer, and the latter is responsible for negligence involving disastrous results, was affirmed.

The Science of War.

The "science of war" means something more than it used to, when war was merely the opposing of brute force with brute force. An illustration of what it now implies is furnished by the *Avenir Militaire*, in an account of the apparatus employed in French gunnery practice. The force and velocity of the wind is first measured by an anemometer. Then the weight of the atmosphere must be determined by a barometer, because sights adjusted to a certain barometric pressure must be changed if the pressure varies. Next a hygrometer is used to determine the amount of moisture in the air, as this determines to some extent the resistance encountered by a projectile in its flight. If the object aimed at is out of sight, the use of the plain table or planchette is necessary. Then the gunner must employ the telemeter to measure the distance of the object to be struck, and when all preparations are made he consults the thermometer to see what the temperature is, since allowance must be made for contraction and expansion of the metallic sights. He is then ready to blaze away, but how many instruments he needs to determine the course of his projectile and the effect of his shot we do not know. With such refinements in gunnery, we should think it would not much longer be necessary to kill men, although it is probable that some mortality will result from trifling errors in calculation, or because the soldiers shot at will not stand still while the gunner is calculating his aim. All that is desired by the most bloodthirsty enemy is to place as many as possible of the opposing force *hors de combat*; then scientific surgery comes in, and it will soon be that, if enough pieces can be collected, the worst wounded men can be put together and patched up so as to be almost as good as new in a few months. It is at least satisfactory to know that the greater the progress in scientific warfare and in the improvement of arms, the fewer are killed and wounded in battle. In the days when opposing forces used to stand at arm's length and hack each other to pieces with short swords and axes, very little was known about the science of war; but more men were often killed in a day than could now be brought into the field by any but a first-class military power. Perhaps it will come some day that, instead of making war, the powers at variance will merely send each other a statement of their military preparations, whereat the weaker power will make the necessary concessions.

The Commercial Statistics of France.

Consular advices received at Washington from Mr. Fairchild, U. S. Consul General at Paris, give us some very interesting, and in some respects surprising, statistics of French trade. In 1878 the foreign commerce of France amounted to \$1,840,111,063.40, an increase of \$52,000,000 over 1877. The imports from the United States were \$104,176,000, nearly double the amount of the previous year. In imports the United States stands second among the nations trading with France, Great Britain being the first. In exports the United States is fifth, the amount in 1878 being \$61,240,000; in 1877, \$63,680,000, and in 1873, \$76,660,000. The exports from France to the United States are steadily decreasing, while imports from the United States rapidly increase. In shipping the figures are not so flattering. Of the 1210 vessels sailing to the United States from France, only 176 bore our flag. Trade in corn is ruined by bad packing. The estimated wine product for 1879 is given at 670,000,000 gallons, a decrease of over 400,000,000 gallons from the product of 1878. The production of silk in 1878 was 30 per cent. less than in 1877, yet the trade generally was good. The savings banks of France make a remarkable showing. The number of depositors in 1870, previous to the war, was 2,130,768; in 1872 it fell to 2,016,550; in 1877 it rose to 2,864,283; in 1878 the deposits were \$132,000,000; in 1878, \$203,000,000. In 1870, 58 persons in 1000 were depositors, while in 1878 there were 78 persons to the thousand. The national debt of France amounts to about \$4,000,000,000, nearly double that of the United States. More than half of the debt of France bears but three per cent. interest. The President's salary is \$120,000, with the same amount for expenses. The civil pensions are \$12,000,000 and military 14,000,000. The cost of the army, about 1,000,000 of men, is \$112,000,000 per annum. The average of letters posted by each person in France is 15; in Italy, Spain and Portugal, only 4; in Switzerland it is 20, the latter being the largest figure shown in European

postal statistics. The French are a very great people. Even their characteristic vices become virtues when regarded from an economic standpoint, and the pettiness of their views on many subjects, which shapes their habits in so many ways, appears in statistics as the fruits of a thrift and frugality of which the people of this country know very little. When we consider the almost microscopic economy of French industries and domestic life among the poorer classes, we need feel no surprise at the wonderful recuperative energy which has so soon obliterated all traces of the war which devastated the country only a few years ago, and sealed what then seemed to be national ruin—the downfall of the Napoleonic dynasty.

It appears that the Boilers' Union do not take kindly to the action of the miners of Western Pennsylvania in attempting to base the scale for mining coal on the price of boiling iron. In the Union column of the *Labor Tribune*, which column is edited at the Union office, we find the following: "Complaints are pouring in from 'the First District in regard to the action of Secretary Jones of the Miners' Association, in persisting in basing the scale for mining coal on that paid for boiling. Our members feel that it is an injustice to them, inasmuch as it makes the A. A. of 'I. and S. W. the medium through which the price paid for mining coal shall be regulated. Certainly we have enough to contend with in regulating the prices of 'our own membership, without being forced, as it were, to fight for the price that shall or shall not be paid members of other organizations working at an entirely different branch of labor. We are requested to make this notice in this issue, 'with a view to getting Secretary Jones to base the scale for coal mining on the selling price of coal, and thus avert what may prove to be an elephant on his hands.' The action of the miners seems cowardly as well as absurd. It is virtually handing their fight over to the boilers, and taking the benefit without incurring the loss. It is like the jackal that hangs around and gorges himself after the lions have feasted. There is but one fair basis of a sliding scale, as there is but one fund out of which wages are paid, and this basis and this fund are the same—the selling price of the product. In this case it is the price of coal. This is the basis of the sliding scales that are being adopted in English mines, and so far we have not seen a hint even of basing these scales on anything else."

NEW PUBLICATIONS.

EXPERIMENTS ON THE STRENGTH OF WROUGHT IRON AND OF CHAIN CABLES. By Commander L. A. Beardslee, U. S. N. Revised and abridged by William Kent. John Wiley & Sons.

We have had occasion repeatedly to refer to the excellent work of the late United States Test Board, prominent among the achievements of which stands Commander Beardslee's "Report on Wrought Iron and Chain Cables," as full an abstract as the exigencies of our space permitted, being printed in recent issues of *The Iron Age*. The original report is a large volume, and as a limited number of copies only were printed, it has not been accessible to many of those deeply interested in the subjects it treats of. By them the present abridgement, edited by Mr. William Kent, whose long familiarity with tests of metals makes him well fitted to undertake the task, will be no doubt received with satisfaction. The subject matter need not be referred to by us at length, as we feel convinced that all who have perused the data given in the columns of *The Iron Age* will be eager to obtain them in a more elaborate and detailed form, especially as the book includes the deductions from the results of the chemical investigations, so ably summarized by Mr. A. L. Holley some time since. The book is well and clearly printed, well bound, and will prove a valuable addition to every metallurgical library.

THE JOURNAL OF THE IRON AND STEEL INSTITUTE, Nov. 2, 1879.

The second part of the transactions of the Iron and Steel Institute has just been issued. It contains the proceedings and important discussions which took place at the Liverpool meeting. As we have already published a full report of all that appeared to be valuable to Americans, we need not enter upon the subject at this time. We desire chiefly to note that the usual annual compilation, edited by the general secretary, is appended to the volume. We expressed on a former occasion our views in regard to the policy of publishing in a work such as the "Transactions," a jumble of abstracts from technical journals and the transactions of kindred institutions, and pointed out numerous errors, both of fact and judgment, on the part of the editor in that portion of the journal. His present effort is an improvement upon the former one, as much of the matter has direct reference to the subjects brought up in the meetings, and there are no startling inaccuracies from a metallurgical point of view. The bulk of the pages are, however, again filled with newspaper clippings, which every progressive member of the Institute has read in the leading journals devoted to the iron and allied trades. Such tables as the Board of Trade returns of the exports of iron and steel of Great Britain for the ten months of 1879, are of great momentary interest, but for future reference in volumes like the journal, are altogether out of place. By the time such a publication is issued, the returns for a later date are already in the hands of every one interested. If the journal is a proper place for such data, why not wait until the year has closed, so that annual statistics, fresh and of permanent value, can be inserted? The collection and publication of accurate statistical information for the iron trade is supposed to be in

good hands since the British Iron Trade Association undertook to furnish it. As Mr. Jeans is secretary of both these important bodies, he ought to be able to draw the line where the province of the one ceases and that of the other begins.

Compressed Air in the Hudson River Tunnel.

A reporter of *The Iron Age* yesterday inspected the work in progress in Jersey City, under the superintendence of Col. Haskin, who is earnestly pushing his project for tunneling the Hudson River to New York city. Looking down into the immense brick well or shaft, 65 feet in depth and 30 feet in diameter, the "air-lock" was seen, just disappearing at the entrance of the horizontal excavation through which, as now predicted, the railroads terminating in Jersey City will run their cars to New York at no distant day. The sheds covering the site also cover two air compressors—Cleyton's and Sargent's—but only the smaller one is running, at a pressure of 10 pounds per square inch in the tunnel. The engineer in charge said the air-lock was working admirably; that without it they could do nothing; there was not the least trouble from the ingress of water. The break in the soil observed a few days ago, was completely remedied by placing over it a false roof of canvas with heavy timbers above. As the substance encountered thus far is "made earth," excepting a layer of about 10 feet of clay, it is expected that much less difficulty will arise from the escape of air when the solid matter composing the river's bed will have been reached. In regard to this, however, engineers are not wholly agreed; but Colonel Haskin is determined to persevere until the question of success or failure is settled beyond a doubt.

The work now immediately in hand consists of attaching circles of boiler plate to the foremost part or facing of the air lock, gradually enlarging the diameter until the full extreme of 30 feet is reached. The brickwork will follow immediately, being sustained by the iron plates (which are $\frac{3}{16}$ inch in thickness), while the cement hardens. The construction will give employment to three gangs of men, working in eight-hour shifts night and day. This arrangement will continue until the enlarged tunnel allows space for the bricklayers, and then a gang of masons will be put on in addition. In preparation several thousand brick have accumulated, to be passed in through the doors of the air lock on diminutive cars, 1500 at a time. Meanwhile, the soil from the tunnel will be fed in a semi-fluid state into a hopper at the end of a pipe, so that when the nozzle and cock are opened the whole mass will be forced back into the rear by atmospheric pressure. A large air reservoir on the surface, supplied by the engines, will keep the pressure uniform.

From the foregoing it will be seen that the work of excavation has made little actual progress, and as yet can hardly be considered as a demonstration of success. The "tug of war" comes after striking the ooze beneath the river, which is still some 50 feet distant. The official engineer, Mr. Payne, who has not heretofore committed himself to the air-pressure theory, remarks that he "never anticipated that the tunnel would hold the air without some imperious lining."

Mr. J. Lloyd Haigh's Affairs.—A meeting of the creditors of J. Lloyd Haigh was held on Monday at his office, No. 81 John street, Mr. Thomas McElrath presiding. Nearly all the creditors were present or were represented. The meeting was secret. At its conclusion the reporters were referred to Mr. Haigh's attorney for information, but he positively declined to give any. From other sources it was learned that the committee appointed at the last meeting reported that in their opinion the best means of realizing the largest possible amount for the creditors would be to have the assignee sell them the assigned estate, then to organize a joint stock company to continue the business, and that stock be issued to each creditor to an amount equal to his claim. It was the opinion of the committee that if certain contracts of Mr. Haigh now in hand were filled they would probably realize enough to pay the creditors in full. The report of the committee was unanimously adopted. Messrs. Thomas McElrath, W. W. Niles and Benjamin F. Blair were appointed as a purchasing committee to purchase as much of the assigned estate as they might consider requisite for the business of the company. A motion was made to reappoint the old committee, but Messrs. Anderson and DeGraaf refused to serve. Mr. Anderson, who is the largest creditor, is said to have estimated that the business properly managed would realize enough in three years to pay the creditors in full. The question of an assessment to raise a fund to start the business was discussed, and it was understood that it would be necessary in order to cover the expenses at the beginning. It is also said to be the general opinion that Mr. Haigh should continue to manage the business.

Orders have been issued by the Philadelphia and Reading Railroad Company, that on and after January 20th, and until further notice, the maximum net rate of freight and tolls on broken coal actually consumed in the process of making iron from ore at any blast furnace situated on the lines of the railroads of the company (including the Reading and Columbia Railroad), will be the same as that on lump and steamer, namely, not over \$1.40 per ton of 2240 pounds from Schuylkill Haven, \$1.55 from Tamaqua, and \$1.60 from Pine Grove.

The Executive Committee of the United States Charcoal Iron Workers' Association met at the Arlington Hotel, Washington, D. C., on the 20th instant.

The directors of the Kharkow-Nicolaiew Railway, at St. Petersburg, are receiving offers for the purchase of between 80,000 and 100,000 tons of old iron rails.

Special Notices.

BOLT and NUT WORKS,

For Sale, Rent or Partnership.

Located at Womelsdorf Station, on Lebanon Valley Railroad, 14 miles above Reading, Pa. Ground adjoining depot property, and contains 11 acres. Main building is 40 x 80; annex building, 30 x 20. The machinery consists of a steam engine, 40 H. P.; 2 boilers, 3 heaters, blowers, shafting and other tools and appliances. There is an elevated siding built expressly for these works, with six large shutters for coal and other material.

The reason for offering these premises is because the undersigned has already invested all his available means in the erection of these works, and would require about \$4000 to put the works in running order. All the machinery is new and most improved. Buildings are of brick, with slate roofs. Water in abundance. This property could be used for foundry or other works. Would prefer a partner.

WM. H. LIVINGOOD,
No. 38 North Sixth Street, Reading, Pa.

ROLLING MILL FOR SALE.

This mill is situated at Canal Dover, Ohio, upon the Ohio Canal, the Cleveland and Pittsburgh, the Marietta, Pittsburgh and Cleveland and the Cleveland, Tuscarawas Valley and Wheeling Railroads. Has 3 puddling and 2 heating furnaces, 1 16-inch muck train, 1 10-inch bar train, first class engine built by Cuyahoga Steam Furnace Co., 14 acres land, block of 6 brick dwellings, warehouse, office, blacksmith shop, etc., complete. Can be put in operation at reasonable expense. Good coal delivered at mill \$1.25 per ton. Price, \$12,000 and terms of payment liberal. Apply to S. W. CROXTON, Canal Dover, Ohio, or RHODES & CO., Cleveland, Ohio.

A Woodruff & Beach Beam Engine,

Low pressure, 42-inch cylinder, 84-inch stroke, with fly-wheel pulley 20 feet diameter, 36-inch face, and

Four Tubular Boilers,

60 inches in diameter, 20 feet long, and all connections practically as good as new.

For sale by
The Geo. Place Machinery Agency,
121 Chambers and 103 Reade St.,
NEW YORK.

Machine Works for Sale.

The property known as the "Portland Machine Works," situated in Portland, Me., No. 215 Commercial St., in close proximity to the main railroad, consisting of about 42,000 feet of land, south side on Commercial St., north on York St., with two-story brick Machine Shop, 42 x 45; Blacksmith Shop, 32 x 40; Boiler Shop, 34 x 46; Foundry, 64 x 64; Melting Room, 24 x 20; Sand Shed, 20 x 40, all brick. Stable and buildings for patterns and flasks. Patterns for the following: Engines, Mill Work, Gearing, Pulleys, Valves, Building patterns, together with all tools, such as Lathes, Planers, Drills, Slotters, Steam Hammer, Cranes, etc., usually found in first-class establishments. Facilities for shipping either by rail or water are excellent. The above works were established in 1857 or thereabouts, and have had a large run of business. Its present capacity is about \$200,000 per year. The above property will be sold very low if applied for soon.

E. B. CORLEY, Portland, } Trustees.
RICHARD PHENIX, }
E. P. CUTLER, Boston, }

IRON ORE LANDS.

Fine Brown Hematite Lands in Virginia for Sale,

near C. and O. Railroad.
Address, BOX 165,
Harrisonburg, Rockingham Co., Va.

Protection in Canada.

The new tariff stops importation. Branches of existing U. S. manufacturing companies are accordingly being established in Canada.

A Complete Manufactory,
with substantial buildings; water power; in good center for labor and railway distribution; obtained by owners by foreclosure; offered for sale at a bargain; terms easy. Full information on application to
DONALD C. RIDOUT,
Toronto, Ontario.

Machinery Wanted.

Engine & Boilers.
Three or four Cylinder Boilers, about 40 inch by 40 to 50 feet, warranted to be in good order. Also wanted, Horizontal Engine, 50 to 100 horse-power. All wanted immediately. Give price, full particulars and place of delivery. FURNACE,
Office of The Iron Age, 83 Reade St., New York.

PRICE BOOKS.

Full Leather, \$7.50. Half Leather, \$6.50.
Pocket Edition, Full Leather, \$5.50.
Bolt List, \$1.50.
Leigh's Discount Book, 50 cents.

Huell Lamberson, 97 Chambers St., N. Y.
For sale at wholesale prices by Wm. Blair & Co., Chicago; A. F. Shipleigh & Co., St. Louis; C. B. James, Detroit.

TO MANUFACTURERS OF AND DEALERS IN LOCKS AND GENERAL HARDWARE.
Wanted, by a young man of 12 years' experience in the Hardware and Lock trade in America, with one of the largest houses in New York, a position either as salesman, stock or shipping clerk. Not afraid to work. Best city references. Salary moderate. Address "LOCK,"
Care A. H. Haviland, 259 Pearl St., New York.

FOR SALE.

The undersigned offers for sale, on account of bad health, his well-established Hardware business. Stock in first-class condition. Terms favorable.
CYRUS DYER,
Middletown, Dauphin Co., Pa.

WANTED—A position, by a thoroughly experienced Manager of Galvanizing in America. References, former employers, who are of the very highest character. Address "R,"
Office of The Iron Age, 83 Reade Street, N. Y.

WANTED—By a young man, a situation as Manager of Galvanizing in America. Thoroughly understands the trade, and could lay out new works if required. First-class references from present employers.
"GALVANIZER,"
Care G. Street & Co.,
30 Cornhill, London, England.

WIRE MANUFACTURER—A gentleman who has had several years' experience in the best mills is desirous of an engagement as Manager. Small mill preferred. Address "WIRE,"
Office of The Iron Age, 83 Reade St., N. Y.

Special Notices.

SECOND-HAND

Machinists' Tools.

One Planer, 48 in. x 10 ft. Wood, Light & Co.
One " 30 in. x 7 ft. Wheeler, nearly new.
One " 27 in. x 6 ft. " " " "
One " 24 in. x 4 ft. Wood, Light & Co.
One " 22 in. x 3 ft. Wheeler, new.
One " 20 in. x 2 ft. " " " "
One Engine Lathe, 50 in. x 10 ft. Wood, Light & Co.
One " 30 in. x 10 ft. Wheeler, new.
One " 26 in. x 13 ft. very heavy.
One " 22 in. x 21 ft. for shafting. Wh'ler.
Three " 20 in. x 6 ft. Wheeler.
One " 19 in. x 7 ft. Whitecomb.
One " 18 in. x 10 ft. Wheeler.
One " 18 in. x 8 ft. Wood, Light & Co.
One " 18 in. x 7 ft. N. Y. S. Eng. Co.
One " 16 in. x 8 ft. Wheeler, new.
One " 16 in. x 7 ft. " " " "
One " 15 in. x 6 ft. Star, new.
Two " 15 in. x 6 ft. Lathe & Morse.
One " 15 in. x 5 ft. " " " "
One " 24 in. x 12 ft. not screw cutting.
One " 16 in. x 10 ft. not screw cutting.
One " 15 in. x 5 ft. not screw cutting.
Six " 12 in. x 4 ft. Sellers. Not screw cutting.
One Chucking Lathe with Chuck. " " " "
Three Hand Lathes, 20 in. x 5 ft. Lincoln.
One " 18 in. x 5 ft. " " " "
One " 15 in. x 5 ft. " " " "
Six " 13 in. x 4 ft. Spencer, New.
Six " 7 in. x 3 ft. " " " "
One Crank Planer, 24 in. stroke.
One 8-inch stroke Shaper. Gould.
One 8-inch " Pratt & Whitney.
One Brown & Sharpe Universal Milling Machine.
One No. 3 Gearing Milling Machine.
Two Lincoln Pattern Milling Machines.
One 10 in. Swing Bladeless Drill.
One 10 in. " " " " " "
One 27 in. Flummer Drill, bk. geared and self-feed, new.
One 24 in. Pratt & Whitney Drill, bk. geared and self-feed, new.
One each No. 1 P. and W., 2 and 3-spindle Drills.
One each No. 1 P. and W., 2 and 3-spindle Drills.
Three Sensitive Drills, drills to 3/8 in. hole.
One No. 1 Brown & Sharpe Screw Machine Chasing Bar.
One No. 6 Wilder Shear, Geared.
One No. 4 " " " "
One Brown Foundry Plate Shear.
One No. 4 Stiles' Planer Press.
One No. 10 H. P. Engine.
Seven Stephens Vices.
Belting, Shafting and Miscellaneous Machinery.
E. P. BULLARD, 14 Day St., New York.

ELIZABETHPORT ROLLING MILL,

Elizabethport, N. J.,

Common and Refined
BAR IRON,
Fish Plates, Spikes, &c.
Address,
DANIEL W. RICHARDS & CO.,
Importers of and Dealers in Scrap Iron and Metals,
88 to 96 Mungin St., New York.

DESIGNS

FURNISHED FOR

Superior Manufacturers' Tools

And Special Appliances.

Improvements made, ideas worked out. Drawings, models, patterns and machines made to order in the best manner.

RICHARDS & DOLE, Springfield, Mass.

ROLLING MILL FOR SALE.

One of the best located iron properties in the State of Pennsylvania. Mill is nearly new, with capacity of 70 tons rails per day.

Address P. O. BOX 2116,
Philadelphia.

FOR SALE,

Job Lots and Bankrupt Stocks Hardware.

Great bargains offered to the trade.

A. W. WHEELER,
141 Lake St., Chicago,

PROPOSALS FOR ROLLED IRON BEAMS.

OFFICE OF BUILDING FOR
STATE, WAR AND NAVY DEPARTMENTS,
WASHINGTON, D. C., January 19, 1880.

SEALED PROPOSALS for furnishing and delivering Rolled Iron Beams at the site of the north wing of the Building for State, War and Navy Departments in this city, will be received at this office, until 12 m. of February 2, 1880, and opened immediately thereafter in presence of bidders.

Specifications, schedule, general instructions for bidders, and blank form of proposal will be furnished to regular manufacturers and dealers upon application to this office.

THOS. LINCOLN CASEY,
Lt.-Col. Corps of Engineers.

FOR SALE.

Water front property of 50 acres or more, with frontage of 1100 feet for docks, suitable for manufacturing purposes. The tract is crossed by the Lehigh Valley, Central of New Jersey and Pennsylvania Railroads, and fronts on deep water on the line of the Delaware and Raritan Canal towing route at Perth Amboy, N. J. It is within a short distance of the terminus of the Lehigh Valley Railroad on the sound at Perth Amboy.

WILLIAM T. MEREDITH,
37 William St., New York.

WANTED

A position by a man of eight years' experience in an architectural foundry in a Western city. Understands architectural drawings and construction, and is familiar with estimating. He is also a bookkeeper. Best references. Address
BOX 222,
Montgomery, Ala.

AGENCY WANTED.

Advertiser, having a capital of \$5000, desires the agency of some large manufacturing business or to represent some house in New York. Address
MERCHANT,
Office of The Iron Age, 83 Reade St., New York.

For Sale,

A ROLLING MILL, located convenient to Pittsburgh, with facilities for river and railroad transportation. The property consists of 28 acres of land, with the necessary buildings, dwellings for workmen, two heating furnaces, eight puddling furnaces, muck train, 16-inch train, 8-inch train, and all the necessary machinery; all in good order, the mill being now in operation. There is a coal shaft on the property, with the privilege of 148 acres of coal, and coal is run direct from mouth of shaft to the furnaces.

For further information address
Lock Box 105, Pittsburgh, Pa.

AN EXPERIENCED HARDWARE

man, fifteen years in one large house in this city. Was bookkeeper, cashier, stock buyer, salesman and one of the managers. Open for any position at a moderate and reasonable salary. First-class city references. Address
HARDWARE, Station L, New York City,

Special Notices.

FOR SALE.

The "Irondale" Hot Blast Charcoal Furnace,

Situated at Irondale, in Washington County, Mo., immediately on the line of the St. L., Iron Mt. & Southern Railway, about 70 miles from St. Louis. Stack 35 feet high, 9 1/2 feet Bosh, with Engine, Boilers and Blast Cylinders of ample capacity, and two Hot Blast Stoves. All in condition to put in blast in a short time, at small expense. Said furnace, being only ten miles by rail from Iron Mountain, has been run almost exclusively on Iron Mt. ores, and its product has always commanded the very highest prices in the Pittsburgh and Western markets. The sale will include 10,500 acres of land, about 4000 of which is well timbered, and an unlimited supply of good charcoal can be delivered at the furnace by rail at low prices. About 350 acres of the land is inclosed with substantial fencing, and is well set in timothy and blue grass, and will afford ample forage for all the live stock necessary for the use of the works. There is also an abundant supply of water for stock and fire. The property is equipped with all necessary buildings, including Coal Houses, Shops, Barns, Dwellings and Storehouse, all in good order for immediate use. For further particulars, including price and terms, address

E. HARRISON & CO.,
No. 941 North Second St., St. Louis.

A. J. STEINMAN, Chairman. W. B. MIDDLETON, Supt.
W. G. MENDENHALL, Sec'y & Treas.

OFFICE OF

PENN IRON COMPANY, Limited,

MANUFACTURERS OF

Merchant Bar Iron, Hammered and

Rolled Axles, Car Forgings, Bridge

Work, Fish Joints, Bolts, E. R. H.

Spikes, Bolt Ends, &c., &c.,

LANCASTER, PA.

WANTED.

A good second-hand Engine, 16 or 17 inch diameter cylinder, short stroke, to run about 200 revolutions per minute; suitable to drive a train of small rolls.

FOR SALE.

One large Planer, 25 ft. long, 5 ft. square, built very heavy, in first class condition. Also, one Boring Mill, one large Slotter, one Shaper, three Drill Presses, one reamer, one of Vise, one Steam Hammer for making blooms, lot of Wood-Working Machinery for making patterns, Shafting and Pulleys; also, large lot of Flasks and Foundry Fittings, for doing light and heavy work, and one large Cupola and one large Foundry Crane, all in good condition and for sale cheap. Address
PENN IRON CO., LIMITED,
Lancaster, Penn.

PRIVATE SALE

OF A VALUABLE

Rolling Mill Property.

The undersigned offer at private sale that certain property known as the "Codorus Works," formerly the property of the York County Iron Company, situated on the Northern Central Railway and the Frederick Division of the Pennsylvania Railroad, at York, Pa. The tract contains about seven acres of ground, with a stream of water passing the same, and on which is erected a frame iron roof Rolling Mill Building, about 100 x 200 feet.

The Machinery consists in part of the following, to wit:

1 Steam Engine, 15 H. P., with two pairs of Shafts.

1 Steam Engine, about 40 H. P., with two Blowing Cylinders.

1 Steam Engine, about 150 H. P., with Duplicate Cylinders.

1 Puddling and Heating Furnaces.

16 Rollers. Steam Hammer.

1 Foundry, 60 x 100 feet, with cupola, crane, &c.

1 Train Muck Rolls.

1 Train Round Iron. Several Trains for T-Rails.

1 Crusher, Pulver, Sorter, &c.

The above property will be sold at a bargain. For further information apply to the

FARMERS' FIRE INSURANCE CO.,

York, Pennsylvania.

For Sale or Lease.

FOUNDRY,

NEW YORK CITY.

The plot of ground (Excelsior Works) measures 275 ft. frontage by 100 feet deep. It has a splendid Foundry, 60 x 100 feet, with cupola, crane, &c. If leased, additional buildings to any extent will be erected to accommodate any kind of manufacturing business. Apply to WM. J. FRYER, Jr.,
Excelsior Iron Works, 104 Goerck Street.

JOHN E. SWAN & BROTHERS,

IRON MERCHANTS,

Glasgow and Middlesbrough,

Exporters of all brands of

Scotch & English Pig Iron.

c. f. i. to America and f. o. b. British ports.

Old Iron Rails, Puddled Bars

AND MANUFACTURED IRON.

Hardware Business For Sale.

Stock about \$15,000 (or less if preferred), all in good order and saleable, in a small New England city (very desirable as a residence), and doing a good business. None but principals address
BOX 95,
Office of The Iron Age, 83 Reade Street, N. Y.

FOR SALE.

Stock of General Hardware, Store Building and good Dwelling connected. Situated in a small town, and one of the best grain markets in Ohio. Good opening for an energetic man. For particulars address
"C,"
Lock Box 126, Canton, Ohio.

AGENT WANTED.

One of the largest German Wire Mills desires a respectable and pushing agent, with first rate connections in the Wire and Rope trades.

Address
WIRE AGENT,
Office of The Iron Age, 83 Reade St., New York.

WANTED

A situation as resident or traveling salesman or bookkeeper with a reliable house East or West, by a gentleman of ten years' experience in the Hardware and Store business; understands bookkeeping by double entry. Good references. Address
F. O. BOX 1157,
New Haven, Conn.

Special Notices.

FOR SALE OR LEASE.

The Extensive Engineering Establishment known as

THE SOUTHWARK FOUNDRY,

PHILADELPHIA.

This property occupies the entire square bounded by Washington avenue, Federal street, Fourth and Fifth streets, and covers about 3 1/2 acres. A track runs entirely through the works, connecting with railway system of the country, by which raw material can be supplied to the various departments, and finished machinery loaded on cars by means of a power crane lifting thirty tons. The improvements are:

Pattern Shop, nearly fire-proof, two stories. 20,400

Storage rooms, entirely fire-proof, each. 24,000

Brass Foundry. 20,000

Brass Pattern Shop, two stories. 10,000

Erecting Shop. 20,000

The Erecting Shop has an intermediate gallery between the boiler and pattern shops, capable of weighing a loaded car.

The second story of the office is one room for the drawing department, connecting with the Superintendent's office, and will accommodate twelve to fifteen draughtsmen.

All of the above are brick; the office, boiler shop and pattern shop fronts on Washington avenue being of pressed brick and harmonious in design.

The shops are supplied with all the tools requisite to carry on a business amounting to over a million dollars per annum, and to employ advantageously from 200 to 300 men.

Machinery all driven by power, as follows: Boiler located in boiler house, about the center of the property; pattern shop has Daniel's planer and a line of lathes driven by a horizontal engine. Foundry has extensive core-ovens, overhead railway crane, driven by its own engine and boiler; one steam crane, one power crane, driven by pump-mill engine; a pair of vertical blowing fans, hydraulic lift for coal and iron; two large cupolas, and all requisite fixtures.

Brass Foundry has four pot furnaces and a small cupola. Erecting shop has in it two large planing machines, one of them a pit machine, which takes a piece of work 8 feet wide, 20 feet long and 20 feet thick, and in which the tool travels. The other is a heavy table planer 120 x 200 feet, in which the work travels.

Two power cranes, lifting 20 tons each, command the floor, and a power crane commands the track, for loading heavy work, and a large lathe, 7 feet swing and 25 feet bed, all driven by an oscillating engine.

In the machine shop, all the tools are of improved construction, driven by two lines of shafting on each floor, all operated by a large horizontal engine, driving them, through belts, in such a manner as will allow each line to be thrown out without interfering with the others.

The lower floor is commanded by cranes through its whole length. A hoist communicates with the second floor, on which are small lathes and planers, and in which the tool travels.

The boiler shop is fitted with power rolls, power riveter with hoist, to take a cylinder boiler 20 feet long. Punch and shears with carriage on track, set so that the plates can be drilled and sheared without readjustment.

On adjoining lot is a stable 18 x 64, which will be sold with the property.

For further particulars, price, terms, &c., address

MERRICK & SONS,

230 South Third St.,

PHILADELPHIA.

JOHN R. WHITLEY & CO.,

European Representatives of First-

Class American Houses,

WITH

FIRST-CLASS AGENTS

IN THE

Cities and Centers of Europe.

TERMS ON APPLICATION.

LONDON, PARIS,

7 Poultry, E. C. 8 Place Vendome.

The Sherman Process Co.

9 Pemberton Square, Boston, Mass.,

Issue Licenses to use the Process for the

Manufacture of Iron and Steel

In the Bessemer Converter, Crucible, Siemens-Martin, Puddling, Blast and Cupola Furnaces.

The use of this Process improves the quality of the product, saves fuel and labor, and does not require any change in furnace or manner of working.

See page 17 of The Iron Age of Oct. 25th, 1877.

WE QUOTE FOR

STEEL OR IRON RAILS, STEEL TIRES,

Axles, Forgings, Bars, Plates, Angles, Sheets and Billets of any temper or for any purpose. Also, Steel Nail Sheets, Wire Rods, Springs, and all kinds of Steel goods. Also, Spiegeleisen, Ferro-manganese and Silicious Pig Iron, f. o. b. any British port, or c. f. i. any United States port. Thirty years' experience in the Steel Trade.

NIXON BROTHERS,

Newcastle-on-Tyne, ENGLAND.

To Skate Manufacturers.

The patent right of a new and superior Roller Skate will be sold or leased to well-established parties.

339 Walnut St., Philadelphia.

For Sale.

Stock of hardware, stoves and implements, and store furniture, in one of the best towns in Kansas.

Address
HARDWARE,
Box 366, Salina, Kansas.

Special Notices.

For Sale.

Special Notices.

BLOWING ENGINE
FOR SALE.

Built by I. P. Morris, Towne & Co., 36-inch
Steam Cylinder, 84-inch Blowing Cylin-
der, 6-feet stroke.

Also, an Air Hoist, with 68 feet lift,
36-inch Cylinder.

They have been well taken care of, are in good
working order and ready for immediate use. Ap-
ply to

POTTSTOWN IRON CO.,
WILLIAM H. MORRIS, Treas.
Pottstown, Pa.

Phosphor-Tin.
Phosphor-Bronze.

A house in Europe, manufacturing Phosphor-
Tin, an indispensable article for the making of
Phosphor-Bronze, now so much in demand, desires
to give an agency to an American house of good
standing dealing in metals. Address, with refer-
ences, P. O. Box 2116, New York.

Wanted.

To exchange cash and some real estate for a
stock of hardware.

ROBERT LUCAS,
Fremont, Ohio.

FOR SALE.

One 10-inch train complete, made by A. Garri-
son & Co., Pittsburgh, consisting of Roughing,
Strand and Guide Rolls, with housings, pitons,
spindles, boxes and all other accessories.
The train is new and has never been used.

Apply to
CHOUTEAU, HARRISON & VALLE IRON CO.,
No. 911 N. Second St., St. Louis.

To the Hardware Trade.

I beg to announce that I have been appointed
Sole Agent by the Renz Hardware Co., Bridge-
port, Conn., for the sale of their celebrated Victor
Cast Shears and all other goods manufactured by
them.

T. G. CONWAY,
90 Chambers St., New York.

FOR SALE.—Valuable Charcoal Furnace Prop-
erty, Hampshire county, West Virginia, near Bal-
timore and Ohio R. R.; about 800 acres well wooded,
with large den of superior quality ore for car-
riage and Bessemer iron. Improvements, one fur-
nace and built-in engine, etc., complete. Ready for
immediate operation. Five months' charcoal on hand.
Apply to

TITUS S. EMERY, 328 Walnut St., Phila., Pa.

FOR SALE.

The entire Canadian right of Kenyon's Ad-
justable Churn Pump Bucket, a su-
perior and substantial article. Can be ac-
curately adjusted to fit the tube, and enlarged to
take up the wear, so that the pumps can be kept
in good working order. United States County and
State rights for sale. Address,

THOMAS KENYON, Patentee,
Box 103, Hamilton, Ohio, U. S. A.

Wanted.

A gentleman of several years' experience on the
road in hardware specialties, would like to make
an engagement with some house or manufacturer
to travel, or would take a line in addition to the
one now handled. Can furnish first class refer-
ences, both present employers and others.
Address
Box 48,
Office of The Iron Age, 83 Reade St., New York.

For Sale.

The Stevens Iron Furnace, located at Drakesville
Station, N. J., on the Lehigh Valley & Western
R. R. Easy of access; in good location for coal
and iron ore. Will be sold at a reasonable price
and easy payments to a good party. For further
particulars, address

GEO. H. MOLLER, Sec'y,
24 Nassau St., New York.

FOR SALE.

12 H. P. Locomotive Boiler; 35 and 40 H. P. Horizontal
Tubular Boiler; 15 and 20 H. P. Vertical Boilers; 10 x
20, 12 x 18, 12 x 14 Horizontal Engines. Pair 6 x 10 Link-
motion Engines; 2 large and 2 small Pumps; 2 Small
Pumps; No. 7 Sturtevant Fan; 3 Pulverizers; 2 S. P. H.
Engines; 2 Crank Planes; 2 Portable Drills; 4 in. Bement Car-
wheel Borer; Suspension Drill; Chuck Lathe; 22 in.
x 20 ft. Sellers Lathe.

A. G. BROOKS & WINEBRENER,
261 N. Third Street, Philadelphia.

FOR SALE.

One 30-horse Wm. Wright Engine.

One 40-horse Yale Iron Works Engine.

One 40-horse Plain Bro. & Co. Boiler.

WANTED.

One second-hand Cupola, about 36 inches diam-
eter outside.

Stiles & Parker Press Co.,
Middletown, Conn.

WANTED.

By a Foundry and Machine Shop, stocked with
first-class workmen and good tools, some light
articles, both in iron and wood, to manufacture.
Prices moderate. Address

BOX 204,
West Chester, Penn.

Wanted to Purchase.

AN

Iron Ore Mill, with Revolving Table.

Send description and price to

S. B. LOWE,

Chattanooga, Tenn.

Pressure Blower.

A No. 6 Root Blower, of extra strength, steel
shafts, used less than four months, for sale at
\$600, f. o. b.

FRANK KING,

Van Buren Furnace, Shenandoah Co., Va.

WANTED.—A situation, by a young man in a
Hardware Manufacturing Co.; has had six
years' experience in the hardware business; has
followed the positions of shipping clerk, salesman
and traveling salesman; is versed in Sash and
Carriage Hardware as well as general hardware;
is connected with a jobbing hardware house at
present. Best references given. Address

HARDWARE MFG. CO.,

Office of The Iron Age, 83 Reade St., New York.

Trade Report.

Office of THE IRON AGE,
WEDNESDAY EVENING, JANUARY 21, 1880.

The financial markets have presented
some interesting features since our last
issue. Messrs. Drexel, Morgan & Co., L.
Von Hoffman & Co. and W. L. Scott, as a
committee of the syndicate which recently
bought 250,000 shares of New York Central
and Hudson River Railroad stock from Mr.
W. H. Vanderbilt, have, jointly with
Messrs. J. S. Morgan & Co., of London,
given notice that they will receive sealed
bids for any part of this stock from Tues-
day, January 20, to Thursday, January 22,
at 3 o'clock. The bids may be for as small
an amount as five shares, and none will be
considered below \$131 per share. The terms
of payment are \$20 per share on allotment,
the balance within four months.

The specie importations for the week
aggregate \$481,083, of which \$318,758 was
gold and \$162,330 silver. The total since
January 1 is \$494,045, consisting of \$326,711
gold and \$167,334 silver. From August 1,
1879, to January 16, 1880, the importations
reached \$78,350,260, including \$75,433,030
gold and \$2,916,630 silver. Of this amount,
\$45,874,534 has been received from the Con-
tinent, \$26,270,884 from Great Britain and
\$6,204,842 from West Indies and South
America.

In the money market, the ruling rate for
call loans has been 5 to 6% with loans as
low as 4%.

Government bonds have been strong, with
the exception of the sixes of 1880-81, which
declined a fraction in the late dealings.

Railroad bonds have been strong and active.
The stock market was strong early in the
week, but subsequently became feverish
and irregular. Louisville and Nashville ad-
vanced from 91 to 121, afterward declined
to 111½, then advanced to 113, and again
declined to 106. Nashville and Chattanooga
declined from 95½ to 80, and then advanced
to 85½, afterward declining to 82. These
fluctuations were occasioned by the purchase
of a controlling interest in the Nashville and
Chattanooga by the Louisville and Nash-
ville Railroad.

The bank return shows a gain of
\$2,217,425 in surplus reserve, which now
stands at \$6,039,825, against \$14,412,750
at this time last year, and \$14,173,725
at the corresponding period in 1878. The
loans show a gain this week of \$874,800;
the specie is up \$2,085,100; the legal ten-
ders are increased \$1,816,400; the deposits
other than United States are up \$6,736,300,
and the circulation is decreased \$2,177,000.

The following is an analysis of the bank
totals of this week compared with that of
last week:

	Jan. 10.	Jan. 17.	Comparisons
Loans.....	\$75,166,300	\$76,999,300	Inc. \$1,833,000
Specie.....	51,473,500	53,558,600	Inc. 2,085,100
Legal tenders.....	14,097,800	15,914,200	Inc. 1,816,400
Tot. reserve.....	60,571,300	62,472,800	Inc. 1,901,500
Deposits.....	24,995,600	25,731,900	Inc. 736,300
Reserve re- quired.....	61,748,000	63,433,975	Inc. 1,685,975
Surplus.....	3,822,400	6,039,825	Inc. 2,217,425
Circulation.....	21,819,300	21,635,900	Dec. 177,000

The foreign trade movements at the port
of New York since our last issue are shown
in the following tables:

IMPORTS.

For the week ended January 17:

	1879.	1879.	1880.
Dry goods.....	\$1,343,410	\$6,227,878	\$1,888,633
General misc.....	4,329,357	1,586,204	4,221,093
Total for week.....	\$3,212,767	\$7,814,082	\$6,109,726
Prev. reported.....	4,077,793	4,507,832	6,015,599

Since Jan. 1..... \$11,222,560 \$4,466,314 \$13,000,235

Included in the imports were items of
merchandise valued as follows:

	Quantity.	Value.
Anvils.....	27	\$245
Brass goods.....	1	14,100
Bronzes.....	1	183
Chains and anchors.....	78	4,976
Copper.....	43,854	33,075
Cutlery.....	155	33,075
Gas fixtures.....	1	707
Guns.....	15	3,154
Hardware.....	3	97
Iron, hoop, tons.....	488	19,794
Iron, pig, tons.....	54	54,770
Iron sheet, tons.....	80	4,321
Railroad bars.....	903	8,801
Metal goods.....	191	16,763
Iron, other, tons.....	221,558	221,558
Nails.....	58	2,528
Needles.....	12	6,142
Nickel.....	14	3,418
Old metal.....	1	2,338
Platina.....	1	2,353
Plated ware.....	112	5,615
Percussion caps.....	117	778
Saddlery.....	3	38,076
Steel.....	3	38,076
Silverware.....	5	358
Tin, bxs.....	131,322	131,322
Tin, 5,821 slabs.....	496,032	103,585
Wine.....	1,207	27,932

EXPORTS, EXCLUSIVE OF SPECIE.

For the week ended January 20:

	1879.	1879.	1880.
For the week.....	\$2,008,167	\$4,247,384	\$5,689,823
Prev. reported.....	5,471,544	4,490,575	4,995,157

Since Jan. 1..... \$11,575,711 \$8,676,955 \$10,685,980

EXPORTS OF SPECIE.

For the week ended January 17:

	1879.	1879.	1880.
Total for the week.....	\$257,967	79,859	79,859
Previously reported.....	79,859	79,859	79,859
Total since January 1, 1880.....	\$328,826	79,859	79,859

Government bonds at the close were strong

at the following quotations:

	Bid.	Asked.
U. S. 6's 1880 registered.....	103½	103½
U. S. 6's 1880 coupon.....	103½	103½
U. S. 6's 1881 registered.....	103½	103½
U. S. 6's 1881 coupon.....	103½	103½
U. S. 6's 1882 registered.....	103½	103½
U. S. 6's 1882 coupon.....	103½	103½
U. S. 4½'s 1881 registered.....	107½	107½
U. S. 4½'s 1881 coupon.....	107½	107½
U. S. 4's 1897 registered.....	104½	104½
U. S. 4's 1897 coupon.....	104½	104½
U. S. 4's 1898 registered.....	104½	104½
U. S. 4's 1898 coupon.....	104½	104½
U. S. Currency 6's 1895.....	122	122
U. S. Currency 6's 1896.....	122	122
U. S. Currency 6's 1897.....	122	122
U. S. Currency 6's 1898.....	122	122

The following were the closing quotations
of active shares:

	Bid.	Asked.
Alton and Terre Haute.....	26½	27½
" " Prof.....	66	66
American District Telegraph.....	72	73
Atlantic and Pacific Telegraph.....	41½	42½
Boston Water Power.....	13½	14½
Burlington and Quincy.....	14½	15½
Canada Southern.....	71½	72½
Cent. Arizona.....	14½	15½
Caribou.....	5	5
Col. Chicago and Indiana Central.....	23½	24½
Clev. Col. Cin. and Indianapolis.....	78	79
Cleveland and Pittsburgh.....	112½	113½
Cleveland, St. Paul and Minn.....	46½	47½
Chicago and Alton.....	137½	138½
" " Prof.....	129	129
Chesapeake and Ohio.....	22	22½
" " 1st Prof.....	31	31½
" " 2d Prof.....	24	24½
Chicago, St. Louis and New Orleans.....	43½	44
Climax.....	3	3
Cedar Falls.....	25	25½
Deadwood.....	25½	26½
Delaware, Lack. and Western.....	85	85½
Delaware and Hudson Canal.....	75½	76½
Express-Adams.....	107½	108½
" " Prof.....	100	100
" " United States.....	49	49½
" " Wells, Fargo & Co.....	100½	101½
Excelsior Mining.....	43½	44½
Harlem.....	160	160
Hannibal and St. Joseph.....	38½	39½
" " Prof.....	38	38
Homestead.....	36	37
Houston and Texas.....	60½	61½
Illinois Central.....	105½	106½
Ind. Cincinnati and Lafayette.....	56½	57½
Kansas Pacific.....	21½	22½
Lake Erie and Western.....	101	101½
Little Pittsburgh.....	30	30½
Louisville and Nashville.....	112	113
Marietta and Cincinnati Preferred.....	28	28½
" " 2d Prof.....	11½	12
Metropolitan Elevated.....	117	117
Morris and Essex.....	103½	104½
Mobile and Ohio.....	24½	25½
Manhattan Railway.....	51½	52½
New York Central.....	123½	124½
New York Elevated.....	124½	125½
New Jersey Central.....	81½	82½
Northwestern.....	50½	51½
Norfolk and Western.....	107	107
Northern Pacific.....	34½	35½
" " Prof.....	57½	58½
Ohio and Mississippi.....	30½	31½
Ontario Silver.....	38½	39½
Pacific Mail.....	41	41½
Quicksilver.....	21½	22½
" " Prof.....	69½	70½
Reading.....	69½	70½
Rock Island and Pacific.....	151	152
St. Louis and Iron Mountain.....	50½	51½
St. Louis and San Francisco.....	43½	44½
" " 1st Prof.....	24	24½
St. Paul.....	77½	78½
" " Prof.....	102	102½
Standard.....	31½	32½
Sutro Tunnel.....	31½	32½
Union Pacific.....	95½	96½
Wahash and Pacific.....	44½	45½
Western Union Telegraph.....	103½	104½

GENERAL HARDWARE.

The truth of the old saying that "it is
easy to sell on a rising market," was never
more apparent than at present, for business
is remarkably active. The upward ten-
dency of Hardware values is still an absorb-
ing topic in the trade, and it is constantly
remarked that, notwithstanding the high
prices which some lines of goods have
reached when compared with the figures
ruling a year ago, the business of the coun-
try goes along steadily increasing in volume,
while the demand seems to be purely con-
sumptive and free from anything of a specu-
lative nature.

In many lines of goods, notably those
which are dependent in the matter of cost
on the values of Iron and Steel, manufac-
turers have felt compelled to withdraw,
at least for the present, all outstanding quo-
tations, and until the Iron markets of the
country settle down upon some basis that
will afford an assurance of permanence,
many lines of goods will be held by the mak-
ers strictly for prices ruling at time of ship-
ment.

We have heard of complaints of over-
charge by dealers who had ordered goods,
not stating a price, and of their refusal in
some instances to receive them at the invoice
figures, claiming that they should have been
informed of the advance, but we can see no
equity in such a claim, and have serious
doubts if even the traditional Philadelphia
lawyer could make out a case for them.

The demand for foreign Hardware is ac-
tive for the season, and an upward ten-
dency in many lines of both German and
English goods is noticeable. The English
market is reported strong, with prices, in
sympathy with the recent advances in Iron,
tending upward. Nettlefold's Screws have,
we are informed, been advanced nearly 50
per cent., and heavy iron goods are all
quoted at higher figures than ruled at the
close of last year.

The Nail manufacturers of the Atlantic
States held a meeting since our last issue,
at which the card was based at \$5.25 for 10d.
to 60d. This is the current rate for small
lots, but large orders are accepted at \$5.15,
net, per keg. The demand is not active, but
this is always the case immediately after an
advance. We quote the market strong at
\$5.15 @ \$5.25, net, according to quantity.

The following shows the fluctuations in
prices of Nails from August 13, 1879, to the
present time—five months:

PRICE OF TENPENNY NAILS IN NEW YORK.

	Aug. 13, 1879.	Aug. 13, 1879.	Aug. 13, 1879.
Aug. 13, 1879.....	\$2.25	2.25	2.25
Aug. 14, 1879.....	2.25	2.25	2.25
Sept. 18, 1879.....	2.25	2.25	2.25
Oct. 2, 1879.....	2.25	2.25	2.25
Dec. 27, 1879.....	2.25	2.25	2.25
Jan. 15, 1880.....	2.25	2.25	2.25

S. H. and E. Y. Moore, Chicago, have ad-
vanced the price of "Climax" Barn Door
Hangers and "Acme" Barn Door Rollers to
discount 40 per cent. from list.

We have received the following:

PHILADELPHIA, Jan. 21, 1880.

We hereby notify the trade that we fill all
orders at the prices ruling at date of ship-
ment, also that we do not guarantee against
a decline.

HENRY DISTON & SONS.

The Tack Manufacturers' Association

adopted the following revised discounts on
the 17th inst.:

Adopted by the Tack Manufacturers' Association,
January 17, 1880, to apply to the Hardware
List of October 17, 1879.

	Dis. per cent.</
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EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the Week ending January 20, 1880:

Austral.	Haere.
Quant. Val.	Quant. Val.
Pt. m., gals. 78,560 \$5,518	Ag. imp. pgs. 734 26,400
Hamburg.	Marseilles.
Mf. iron, pgs. 5 67	Pt. m., gals. 176,178 13,35
Belting, pgs. 17 2,735	London.
Mach'y, pgs. 63 17,130	Hdw., cs. 558 9,326
Lab. oil, blbs. 84 2,244	Glassware, cs. 2 13
Glassware, pgs. 8 225	Mf. iron, pgs. 61 459
Spelter, slabs 2749 9,285	Rifles, cs. 3 560
Wringers, cs. 8 192	Sew. mach., cs. 13 500
Ag. imp. pgs. 11 350	Ox-bow, black 250 10,000
Sew. mach., cs. 393 3,958	Lab. oil, blbs. 628 8,113
Bremen.	Brass g'ds, cs. 6 300
Pt. m., gals. 84,603 144,056	Ag. imp. pgs. 13 574
Mf. iron, pgs. 3 136	Lea. bell, cs. 2 1,000
Ag. imp. pgs. 8 324	R.R. cars, 7 3,750
Teleph. co., cs. 10 1,710	Mach'y, cs. 100 2,500
Hdw., cs. 200 500	Pumps, pgs. 4 111
Dutch East India.	Pt. m., gals. 8,416,534 31,000
Pt. m., gals. 2,067,516 241,155	Tristate.
Antwerp.	Pt. m., gals. 353,000 31,100
Pt. m., gals. 683,793 50,703	Blaye.
Lab. oil, blbs. 510 14,848	Pt. m., gals. 201,750 14,640
Bristol.	Cadiz.
Pt. m., gals. 275,177 19,257	Pt. m., gals. 1,600 66,000
Hull.	Porto Rico.
Ag. imp. pgs. 17 275	Wtr. pipes, pgs. 50 600
Hdw., cs. 3 275	Hdw., cs. 1 22
Pumps, pgs. 3 60	Cuba.
Mf. iron, pgs. 3 60	Pt. m., gals. 16,450 2,093
Liverpool.	Ag. imp. pgs. 9 445
Plated ware, cs. 3 196	Hoops, bls. 1949 3,398
Mach'y pgs. 54 7,315	Mf. iron, pgs. 194 9,423
Lab. oil, blbs. 205 5,594	Hdw., cs. 9 696
Steel, cs. 1 55	Scale, pgs. 35 300
Cutlery, cs. 1 120	Grindstones, 46 55
Mt. g'ds, cs. 7 1,004	Mach'y, pgs. 136 2,937
Pt. m., gals. 269,929 27,250	Pile glass, pgs. 4 100
Hdw., pgs. 70 4,410	Lab. oil, blbs. 850 281
Sew. mach., cs. 210 2,400	Nails, pgs. 11 210
Rifles, cs. 60 11,700	Sew. mach., cs. 104 1,070
Teleph. pgs. 18 5,100	Best Bloom Sheets, No. 22 to 25 1,070
Mf. iron, pgs. 8 75	Best Bloom Sheets, No. 16 to 21 1,070
Ag. imp. pgs. 80 17,085	Common Red Plates, 3-16 to 16 1,070
Glasgow.	Blue Annealed, 3-16 to 16 1,070
Mach'y, pgs. 9 350	Best Bloom Galvanized, discount 1,070
Cartridges, cs. 8 60	Second quality, discount 1,070
Spring, cs. 16 850	Hayti.
Iron rolls, cs. 1 295	Pt. m., gals. 9960 388
Lab. oil, blbs. 260 1,653	Mach'y, pgs. 20 983
Ag. imp. pgs. 15 720	Mf. iron, pgs. 14 348
Lab. oil, blbs. 14 335	Iron, pgs. 49 380
Hdw., pgs. 134 1,970	Cutlery, cs. 4 235
British North American Colonies.	Cot. pipes, cs. 1 118
Pt. m., gals. 703 131	Mot. g'ds, pgs. 14 370
Coal, tons. 392 1,710	Lisbon.
British East Indies.	Cars, 2 1,565
Car mts., pgs. 1 50	Mf. iron, pgs. 5 445
Forges, 7 250	R.R. cars, 8 4,000
Mdw., pgs. 13 720	United States of Columbia.
British Guiana.	Cartridges, cs. 8 50
Hdw., pgs. 17 255	Hdw., cs. 18 153
Glassware, cs. 22 293	Pt. m., gals. 492 80
Car. mts., pgs. 41 235	Bullets, kegs. 30 141
British West Indies.	Powder, lbs. 625 137
Hdw., cs. 26 333	Venezuela.
Nails, kegs. 22 433	Edw., cs. 13 131
Y. m. sheath, cs. 8 549	Mach'y, pgs. 3 135
Nails, bxs. 6 40	Pt. m., gals. 339 774
Mf. iron, pgs. 5 58	Cutlery, cs. 17 231
Pt. m., gals. 10,063 1,106	Mf. iron, pgs. 10 104
Oil sew. re. pgs. 14 81	Glassware, cs. 20 397
British Honduras.	Pumps, pgs. 3 230
Edw., pgs. 14 280	Brazil.
Nails, kegs. 3 31	Pt. m., gals. 10,821 18,004
Pt. m., gals. 1887 258	Edw., cs. 180 9,225
Sew. mach., cs. 4 60	Ag. imp. pgs. 131 884
Wire, boxes. 13 70	Iron, cs. 100 550
British Possessions in Africa.	Glassware, cs. 46 1,045
Pt. m., gals. 173,300 24,775	Pumps, pgs. 4 400
Sew. mach., cs. 125 2,000	Mach'y, pgs. 2 40
Mf. iron, pgs. 9 3,115	Cutlery, cs. 21 255
Nails, kegs. 103 410	Mf. iron, pgs. 6 110
Platware, cs. 1,000 2,000	Argentine Republic.
Wire g'ds, cs. 7 78	Hdw., cs. 18 393
Hdw., cs. 8 1,265	Tinware, cs. 6 140
Nails, kegs. 4 65	Pumps, pgs. 7 370
Glassware, cs. 6 125	Ag. imp. pgs. 107 2,623
Fire arms, cs. 1 100	Glassware, cs. 23 665
	Sew. mach., cs. 92 1,857
	Sandp'r, cs. 37 370
	Mach'y, cs. 8 330

PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., Philadelphia, Pa., Jan. 20, 1880.

Pig Iron.—We have again to note a further advance in prices, amounting on an average during the week to about \$2 per ton. The market is less active, however, and for the time being it seems as though the advancing tendency is likely to be checked. Buyers in this vicinity have pretty generally supplied their immediate wants, and unless the speculative feeling breaks out again, a steady market at uniform prices may be looked for. Much will depend, however, upon the character of the demand from the West; if consumers in that section find it necessary to repeat purchases here, a further advance is inevitable. Stocks at furnaces are entirely exhausted, and the companies have sold so largely for future delivery that they are perfectly indifferent about new business. The general condition of the market, therefore, may be considered very strong, and while, as before stated, the market at the moment is something quieter than it has been, there is nothing in sight likely to depress prices, but on the contrary, a very slight movement might lead to a further advance. The prevailing opinion seems to be that high prices will continue during the current year, and that present quotations are perfectly safe. This expectation is based on the impression that the productive capacity of the country cannot for the present outrun consumption, and that importations will be taken care of by speculators. This view is probably correct, and notwithstanding the comparatively dizzy heights to which prices have attained, everybody seems confident, the only anxiety being to secure supplies regardless of cost. Prices are difficult to quote, but the highest figures have been realized during the past few days, and holders are asking extreme rates and are very firm. During the week we note sales of North of England Pigs to arrive at \$29 @ \$30 for No. 3, and \$31 @ \$33 for No. 1, the outside rates asked to-day; small lots from store command about \$2 more money. Scotch irons are held at an advance, Eglington \$26, Garthsherrrie \$38 from store. Lehigh irons are very scarce and subject to change at any moment. Latest sales have been at \$37 @ \$38 for Gray Forge, \$40 for No. 2, and about \$41 @ \$42 for No. 1, all on furnace banks, or \$1.50 additional for delivery Philadelphia.

Muck Bars.—The market has been rather quiet, but holders are generally firm at \$60. Some sales have been made at slightly lower figures, but \$60 may now be regarded as a fair quotation.

Structural Iron.—The demand cannot be called active, although there is a fair business doing, with more in prospect. The rapid advance in prices seems to have checked the demand in some quarters, but manufacturers are quite easy, having fair orders on their books, with inquiries promising a steady addition from time to time. It is thought that a large amount of work will be given out during the spring months, and prices are steadily maintained. Angles quoted 3.6¢ @ 4¢; Beams, Channels, and Tees, 4.5¢.

Plate and Tank Iron.—Business in this department is not active, and we hear of but little inquiry at the moment. The mills have still some orders on hand, so that there are no complaints of dullness, although manufacturers would like to see more inquiries. Prices are steady as quoted last week, although higher rates are anticipated at an early date. We quote: Tank, 4.3¢; C, No. 1, 4.5¢; C, H, No. 1 Shell, 4.7¢; Flange, 6¢; Flange Fire-Box, 7¢; Best Bloom, 7.5¢.

Sheet Iron.—This branch of the iron trade is very busy, and manufacturers have declined many orders during the past week. Stocks with them are light, and as they have already an average of nearly three months' work on hand, they are for the present indifferent about any additional orders. There is a general anticipation of higher prices towards spring, hence the urgency to place orders now. The following are to-day about current rates for small lots, but prices are subject to change at any moment:

Common Sheet, No. 25 to 28	6.5¢
Common Sheet, No. 22 to 25	6.5¢
Common Sheet, No. 16 to 21	6.5¢
Best Refined 1/2¢ advance on the above	
Best Bloom Sheet, No. 22 to 25	7.5¢
Best Bloom Sheet, No. 16 to 21	7.5¢
Common Red Plates, 3-16 to 16	4.3¢
Blue Annealed, 3-16 to 16	4.3¢
Best Bloom Galvanized, discount	10.5¢
Second quality, discount	10.5¢

Bar Iron.—The market is unsettled, but prices keep on advancing, without the slightest indication of a reaction. Buyers are at hand for all the iron that is offered, and manufacturers have declined many desirable orders for future months unless subject to price at time of delivery. Some have placed orders on these terms, which is evidence that there is an apprehension of actual scarcity. Stocks in first hands are unusually light, while the requirements of others are such that they are compelled to carry more than usual. The price of bars is nominally 3.6¢, but 3.75¢ may be regarded as nearer the actual selling price, while many decline to offer orders for next month at less than 4¢. Skelp Iron is in active demand, and has been sold during the week at 4¢ for grooved, and 4.5¢ for sheared. Market for all kinds active and firm.

Steel Rails.—The market is unchanged, but prices are very firm at \$80 @ \$85 at mill. We cannot hear of any orders having been placed during the week, as manufacturers prefer running off what they have on hand rather than to enter into new engagements. English rails could be laid down to-day at about \$80, but we have no information as to recent transactions. A sale was made last week of 5000 tons rails, made from imported blooms, at \$75 at Pittsburgh, which is the only definite sale reported. Reports of an anticipated reduction in duties have been current for some days past; the effect in England appears to have been an immediate advance in rails there equal to \$12.50 per ton, so that if any change should be made it will probably be so much lost to the U. S. Treasury, and so much gain to manufacturers in foreign countries.

Iron Rails.—The market is firm, and prices are still tending upward. Sales have been made at \$65, at mill, but manufacturers would hesitate before taking anything now for less than \$70. The mills are pretty full of work, and there is no disposition to force business. Prospects continue very encouraging, and there is no uneasiness in regard to the immediate future. We quote market firm at \$67.50 @ \$70, at mill.

Old Rails.—The market has been quite active during the week, and, as a rule, has shown a steadily-advancing tendency. The demand has been more active during the past day or two, and prices are from \$1 to \$2 per ton higher than they were on Saturday. Holders are firmer in their views, and \$44 @ \$45 is asked, spot and to arrive, with several transactions reported at extreme figures. Sales have been made at \$42 @ \$43, but we hear of nothing offered to-day, unless at the advance above named, at which figures several lots have been closed.

Scrap Iron.—Firm and higher. Wrought sold at \$40 @ \$42; Cast, \$30 @ \$32.

Nails.—We have to note a further advance to \$5.25, and, with light stocks, holders are very firm.

PITTSBURGH.

Office of The Iron Age, 77 Fourth Avenue, Pittsburg, Pa., Jan. 20, 1880.

The principal local event the past week was the strike by the coal miners, the effect of which has been serious to all large consumers, as the price has gone up fully 2¢ per bushel. In addition to the enhanced cost, there is an actual scarcity, and some of our mills have been obliged to curtail operations in consequence. These coal miners appear to have an innate propensity for striking; as soon as they get a little money ahead, they are ready for a strike, and while occasionally they gain their point, they are always the greatest sufferers in the end. Some of the operators whose mines are located along the railroads, and who have contracts here and elsewhere, have succumbed, but most of the river operators are still holding out and refuse to pay the advance. These strikes have a bad effect upon general business, as coal is a very important factor in the production of all our leading manufactures, and an advance of 2¢ @ 3¢ per bushel counts up, especially with those of our manufacturers who are sold ahead, and cannot charge it up to the buyer

by increasing the price of his goods. There is no city of its size in the country that uses anything like as much coal as Pittsburgh—hence the appellation of the "Smoky City."

Pig Iron.—There has been less activity the past week, but no weakness; on the contrary, the market is as strong as ever, and sellers generally expect still higher prices. That there should be a "lull," however, is not strange, as nearly all the furnaces in the West are sold for some time ahead, while consumers generally have enough bought to keep them going for from two to four months; hence, while there are still buyers for all the desirable lots that offer, the demand is not as urgent as it was a few weeks ago; at the same time the offerings are very meager. For a considerable time there was more anthracite iron sold here than any other kind, but the sales for some weeks past have been light, which may be attributed to the fact that the furnaces in that section are generally sold ahead, and still more important, they are now able to obtain better prices at home than are obtainable here. While we hear a great deal about the advance in Pig Iron being entirely too rapid, it is well to note that it has scarcely kept pace with the enhanced cost of production. Ores, limestone, coal, labor, &c., are all very much higher and still tending upward, and during the past week there has been a further advance in coke, which was helped forward by the coal miners' strike. Good Neutral Mill Irons may be quoted at \$38 @ \$40, 4 mos.; sale 1250 tons at \$38, 4 mos.; 1000 tons all-ore Red-short at \$42, and we hear of a sale of Bessemer at \$46.50, delivered at furnace at New Castle, Pa.; Nos. 2 and 1 Foundry, \$38 @ \$40, with an increasing demand for the latter.

Manufactured Iron.—The market for all kinds of Manufactured Iron is firm at full card rates, with bars at 3 1/2¢ as the base, and as raw iron has gone up fully 5¢ per ton since the card was established, a further advance soon is not improbable. There are various reasons urged against putting the card up higher, chief among which is that it hurts those who are sold ahead by increasing the cost of labor, and then it is apprehended that it would be immediately followed by a further advance of \$3 @ \$5 per ton in the price of Pig Iron, as was the case when the present card was established. Skelp Iron is quoted at 3.6¢ @ 3.8¢, net; Sheet at 5¢ for No. 24, and Plate at 4 1/4¢, net. There is a continued good demand, and manufacturers generally are refusing to make any large contracts for future delivery.

Nails.—The market is rather quiet, the recent sharp advance having, as it was expected it would, checked the demand; however, this is ordinarily a dull month in the Nail trade, and it is probable orders will commence to come forward pretty freely early next month. We now quote at \$5, 60 days, 2¢ off for cash, and the usual abatement of 10¢ per keg on lots of 200 kegs and upward.

Railway Spikes.—For which there is a continued brisk demand, have further advanced, and we now quote at 4 1/2¢ @ 5¢, 30 days. All kinds of railway supplies are going up, owing to the enhanced cost of iron, and it is probable the sharp advance in the former will curtail the consumption.

Wrought Iron Pipe.—There is more inquiry than usual at this season of the year, which is owing to an apprehension on the part of buyers that a further advance soon is not improbable. We continue to quote at 25¢ off, but it is doubtful whether a large order could be placed at the rate in question. Boiler Tubes unchanged at 5¢ and 5 1/2¢, discount. Oil-Well Casing, 3/4-inch, \$1, net; do. Tubing, 2 inch, 35¢, net.

Muck Bar.—Very little offering or to be had, as the mills generally are using about all they can make. There was a sale of 300 tons last week at \$58, cash, but the same would have brought \$60 a day or two afterward, and we quote at \$60 @ \$62, cash, at mill, according to quality.

Rails.—The market for Steel Rails continues firm, with considerable inquiry, the mills here refusing to accept any additional orders. The last sale reported was at \$80, cash, at mill, but it is doubtful whether they could be bought now under \$85, or more than double the price ruling at the same time last year. Old Rails are also firm and tending upward. There are no old American to be had, hence Pittsburgh consumers are drawing their supplies from the seaboard markets.

Steel.—There appears to be no end to the demand for Merchant Steel. The Steel mills have had all they could do for several years, while the iron mills during the greater part of that time had very little to do, and then at starvation rates. It was thought by some that the largely increased consumption of iron would control that of Steel, but, on the contrary, the demand for Steel still appears to be expanding. Prices are firm at card rates.

Scrap.—There is more doing and prices are firmer. No. 1 Wrought Scrap, per net ton, \$41 @ \$42; Car Axles, \$43 @ \$45; Car Springs, \$40; Wrought Turnings, \$25 @ \$27; Old Car Wheels, gross, \$38 @ \$40. These are about as near the actual selling rates as it is possible to obtain.

Coke.—The "boom" in the coke trade still continues, the recent strike by the coal miners having sent the price up 25¢ to 50¢ per ton, and it is very difficult to obtain, even at the advance, as most of the operators are sold ahead, and owing to the upward tendency of prices, it is almost impossible to contract for delivery beyond thirty days. Some operators were unfortunate enough several months ago to make contracts for future delivery. We advance our quotations to \$3 @ \$3.25 per ton, delivered free on cars at ovens.

Window Glass.—The semi-yearly meeting of the National Association took place at Washington City last week; it was largely attended, nearly all the factories in the country being represented. The session was a harmonious and satisfactory one. The reports made by nearly all those present were of a very encouraging character; the demand at all points is much better than usual at this season of the year. Stocks are light, and very few sales made for future

delivery, with every indication of a large demand during the spring and summer. The reports made showed that there were but 9000 boxes sold on Jan. 1, 1880, in excess of stock on hand. There was no change made in the card, although it was strongly insisted upon by some of the New Yorkers. The matter of discount is left to the various local associations. The attention of Secretary Sherman was called to an alleged crookedness on the part of some of the importers of foreign glass, and he promised to have the matter investigated. The next meeting of the association takes place at Cape May on the second Tuesday of July. It was agreed that there should be a suspension by all the factories during the months of July and August.

Coal.—Several of the coal operators have succumbed to the miners, agreeing to pay the advance, and the price of Coal here has gone up from 1¢ to 2¢ per bushel, and it is hard to obtain at the advance. Coal is now bringing almost as much here as it is at Cincinnati.

Petroleum.—This important interest continues in a depressed condition, prices having declined materially within the past week. It sold down as low as \$1.05, and we should not be surprised if it went to the even dollar before the close of the present week.

CHATTANOOGA.

Office of The Iron Age, Market and 8th Sts., Chattanooga, Jan. 19, 1880.

Trade in manufactured articles of all kinds is very active and prices tend to advance. This induces producers to be cautious about making contracts. They all expect higher prices in the future. The river trade in grain and heavy articles continues in large and increasing volume. The exceptional activity is similar to that which prevailed in 1872, though less feverish and more healthy in all respects, while the volume of business now is very much larger and more profitable than it was then. The weather for the week was bright and cool until the close, ending with continuous warm rain.

Pig Iron.—The trade has been large. Nearly all transactions have been on private terms, making quotations difficult in all cases and exactness in any impossible. No. 1 Foundry, best quality, has sold freely in car-load lots to consumers and dealers at \$36 @ \$38. We have heard of no large lots at these rates, and therefore we continue the old figures. We quote: Coke and Charcoal No. 1 Foundry, \$35 @ \$37; Gray Forge, \$31 @ \$33; White and Mottled, \$26 @ \$28; Car Wheel Metal, \$35 @ \$45.

Muck Bar, &c.—The market is still bare of Muck Bar and Old Rails. We continue rates as before on other miscellaneous articles. We quote Wrought Scrap at \$25 @ \$35; inferior do., \$17 @ \$24; Cast Scrap, \$20 @ \$25; inferior do., \$15 @ \$20. We quote Old Car Wheels at \$30 @ \$35, according to make.

Ores.—The demand for Ores is now in excess of anything ever known in the district. But a "corner" is not possible, because the supply is only limited by the supply and price of labor. Ores are in such plentiful amounts, they lie so conveniently for mining and are so cheap in the mines, that but small capital and skill are required to bring them to market at a fair profit at reasonably low rates. We continue quotations: Brown Hematite, 50¢ @ 56¢ per ton, at \$2 @ \$2.75 per ton; Red Fossil, \$2 @ \$2.25, on cars or on wharf from flat boats.

Nails.—The advance in Nails at Wheeling and Pittsburgh has had no effect here, except to put the price 25¢ higher than the association card. The trade continues, as before, very brisk, mills selecting their orders, and not making contracts for future delivery at any fixed price. We quote at \$5.25 rates.

Manufactured Iron.—The market is strong in sympathy with pig. We continue last week's figures in most, though small lots of some articles could not be bought: Bars, \$3.75; Railroad Spikes, \$4.10, an advance of 10¢; Track Bolts, \$5; Trostle Bolts, \$6, an advance of 25¢. The two articles advanced are very strong, and makers indifferent about selling.

Coal.—The warm winter has been an embarrassing feature in household coals, which have barely kept up to fall prices. We quote run of mine at \$1.75 @ \$2 and in fair supply. Lump sells at 10¢ @ 12¢ per bushel, delivered.

Coke.—The market is strong at last week's figures. Makers are increasing their facilities to meet the demand, and an easier market may be expected by spring.

Steel and Iron Rails.—We quote Steel at \$75, Iron \$60, both nominal.

BOSTON.

JANUARY 17.—Prices have advanced materially for nearly all articles under this head since our last report, and the boom appears to be on again in all classes of iron and manufactures of iron. The tone of the market is so decidedly bullish that it is difficult to give exact quotations; but sales have been made of No. 1 X Foundry Pig Iron at \$39 at furnace; and at \$40 for No. 1 X; \$38 @ \$39 for No. 2 X, and \$38 @ \$39 for Gray Forge at the shipping ports. As stated last week the advance in prices is responded to less readily at this point than at the West. The needs of New England consumers are not as pressing as those of users of the metal in other sections. Scotch Pig has been active and firm at the rates quoted by holders at this point last week, and the views of the latter are now fully established. There has been further rise in Glasgow, and other markets have responded. We quote Eglington at \$37; Old Rails have sold this week at \$44 for American, and holders are now asking \$45. Foreign Rails close at \$43 @ \$44 for D. H., and \$41 @ \$42 for T's. Manufactured Iron is in active demand at higher prices. Ordinary refined iron is selling at 3 1/2¢ out of store, and as all of the mills in this section are under the control of orders, and the Western mills are asking still higher prices, nothing under 3 1/2¢ can be quoted. The plate mills are generally

sold two or three months ahead, and in the present state of the market are indisposed to take any large orders for future delivery. We quote 4 1/2¢ for tank; 4 1/2¢ for C No. 1; 5¢ for shell, and 6¢ for flange; but it is difficult to place at orders at to-day's prices. Norway and Swedish bars are now quoted at \$100 @ \$110 per ton, and shapes at \$122.50 @ \$130. Nails have this week undergone another advance, the second within 30 days, and are now firm at \$5.15 net for rod to 60d. Copper—Manufactures are without material change, and we continue to quote Copper Sheathing at 28¢; Braziers at 30¢; Bolts, 30¢; Bottoms, 35¢; American Yellow Metal Sheathing, 17¢ @ 18¢; Yellow Metal Bolts, 20¢, and English do., 13 1/4¢, in bond. Antimony is in fair demand and firm at 18¢ @ 20¢. Lead is firm and buoyant, and the views of some holders are above the present market, quoting 5 1/2¢ @ 6¢ for large lots of Pig. There has been no advance as yet in Manufactures, and we continue to quote: Lead Pipe, 7 1/2¢; Tin-Lined Pipe, 15¢; Bar Lead, 7¢; Sheet Lead, 8¢; Block Tin Pipe, 40¢; all of these are subject to the usual trade or 10¢ discount. Spelter is quiet and steady at 6¢ @ 6 1/4¢. Tin has continued to advance, and there have been large sales of Straits rising to 23 1/4¢ @ 23 3/4¢. At the close 24¢ is asked.—Commercial Bulletin.

BALTIMORE.

W. N. WYETH, Iron and Steel Merchant, 46 and 48 South Charles street, Baltimore, reports us the following under date of Jan. 19: Trade continues ruling very active, with small stocks much broken. All indications point to yet higher values in the near future.

Ref. Bar Iron, 1 to 6 by 3/4 to 1. 3 1/2 @ 3 5/10
" 1 to 4 1/2 by 1 1/2 to 2. 3 1/2 @ 3 5/10
" 3/4 to 2, Round 3 1/2 @ 3 5/10
" and Square 3 1/2 @ 3 5/10
" Hoop Iron, 1 1/4 wide and upward. 4 1/4 @ 4 1/2
" Band Iron, from 1 1/4 to 4 in. wide. 4 1/4 @ 4 1/2
" Horse-shoe Iron 4 1/4 @ 4 1/2
" Norway Nail Rods 5 1/2 @ 5 1/2
" Black Diamond Cast Steel 12 1/2 @ 13 1/2
" Machinery Steel 7 1/2 @ 8 1/2
" Cast Spring Steel 8 1/2 @ 9 1/2
" Homogeneous Steel Plate 8 1/2 @ 9 1/2
" Common Horse Nails 10 @ 14 1/2
" Perkins' Horse shoes, 7 keg of 100 lbs. 5 1/2 @ 5 1/2
" Mule shoes 5 1/2 @ 5 1/2
" Putnam Horse Nails 21 @ 23 24 26
" Globe Horse Nails 20 @ 22 23 25
" Railroad Spikes 3 1/2 @ 4 1/2
" Less list discount to the trade

R. C. HOFFMAN & Co., Iron and Commission Merchants, report the Pig Iron market as follows under date of Jan. 19: We have to report a further advance in iron during the past week, and quote present prices as follows:

Baltimore Charcoal Wheel Iron \$35.00 @ 60.00
" Southern 35.00 @ 60.00
" Anthracite No. 1 42.00 @ 47.00
" No. 2 30.00 @ 40.00
" No. 3 38.00 @ 42.00
" Mottled and White 36.00 @ 37.00
" Charcoal C. B. Blooms 35.00 @ 42.00
" Billets 9.00 @ 92.00
" Refined Blooms 75.00 @ 80.00

ST. LOUIS.

St. Louis, Mo., January 17, 1880.
Business continues very active, with iron in short supply. The following quotations fairly represent the market:

PATENT DECISION.

Hardware dealers will please take notice of the decree of Judge Lowell, of the United States Circuit Court, in the case of Millers Falls Company against Quimby S. Backus, for infringement of Bit Brace Patents, which decree was in favor of the Millers Falls Company. The full text of the opinion may be found on page 11 of *The Iron Age*, of date December 18, 1879.

We have now obtained three separate decrees against three different manufacturers, and shall continue to prosecute all infringers. When the manufacturers are able to pay the damages we shall in no case trouble dealers, but when manufacturers are unable to pay we must ask the dealers to remunerate us, else responsible dealers might combine with irresponsible makers to render worthless the most valuable patents. Any reasonable man can see the point, and we have before given all dealers sufficient notice.

MILLERS FALLS CO.,
74 Chambers street, New York.

F. HABERMAN,

MANUFACTURER OF

STAMPED, JAPANNED AND PLAIN TINWARE.

DEALER IN

House Furnishing Hardware,
AND
TINNERS' TOOLS AND MACHINES.

No. 294 PEARL STREET,

(Bet. Beekman & Peck Slip.)

NEW YORK.

"Climax" Reversible Ice Creeper.



PATENTED APRIL 20, 1878.

A simple and sure prevention against falling on icy pavements. Easily adjusted to the boot or shoe. For prices and terms to the Trade, apply to the manufacturers.

CHILDS, GROFF & CO.,
CLEVELAND, O.

FOR SALE BY

BIDDLE HARDWARE CO., Philadelphia.

PECK & SNYDER, New York.

SMITH, COVERT & CO., Albany.

J. P. PHINNEY & CO., Boston.

PRATT & CO., Buffalo.

EDWIN HUNT'S SONS, Chicago.

HAMILTON & MATHEWS, Rochester, N. Y.

LANE'S MEASURING FAUCET.

Price, \$3.00.

For Light or Heavy Molasses, Oils, Varnishes or other Fluids.

We warrant these Faucets to be as represented, measuring correctly and working more easily in heavy molasses than any measuring Faucet in the market. No grocer can afford to be without them, for they save time, and "time is money." They insure perfect cleanliness, requiring no tin measure or funnel to collect dirt and draw flies. They do not drip. They prevent all waste, as no molasses or other fluid can pass except when the crank is turned. They are the embodiment of simplicity, and consequently they are always in order. They work easily in the heaviest molasses. They are warranted to measure correctly, according to U. S. Standard.

MANUFACTURED EXCLUSIVELY BY

LANE BROS., Millbrook, N. Y.

General Agency, GRAHAM & HAINES, 113 Chambers St., New York.



NICHOLS' SELF-ACTING ACID PUMP.

Absolute Safety!
Perfect Ease!

Time, Labor and Material saved by using the

NICHOLS ACID PUMPS,

to draw all kinds of acids from

carboys. Every pump warranted.

Send for new circular and price list. Manufactured only by

Acid Pump & Siphon Co

New London,

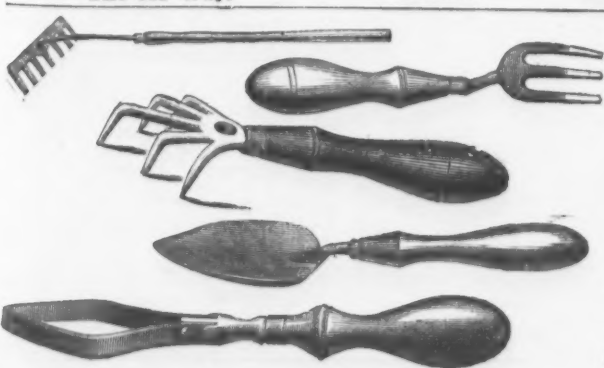
Conn.



The Old Way.



The New.



Garden,
Floral &
Farm
TOOLS
CHEAP, OF
Enterprise
Mfg. Co.,
Geneva, Ohio.

NATIONAL Horse Nail Co.

MANUFACTURERS OF

FINISHED

[BRIGHT OR BLUED]



These nails are made of the best brands of NORWAY IRON, and are guaranteed to be equal to any in the market.

NATIONAL HORSE NAIL CO.,
VERGENNES, VT.

DURRIE & McCARTY, Agents,
No. 97 Chambers St., New York

The Oldest Shot Tower in America.
FOUNDED JULY 4, 1808.



THOMAS W. SPARKS,
Manufacturer of

SPARKS'

American Chilled Shot.

Rivaling the English and all Others.
STANDARD DROP & BUCK SHOT
AND BAR LEAD.

191 Walnut Street, Philadelphia.

THE
Sprague Novelty Works,
15, 17 & 19 North Water Street,
ROCHESTER, N. Y.,

Manufacturers of

Hardware Specialties,
SPRAGUE'S

"Perfection," "Combination"
and other Razor Stropps.

Refer to *The Iron Age* first issue of each month.

A. F. PIKE,
East Haverhill, - New Hampshire,
Manufacturer and Wholesale Dealer in

Scythe, Axe, Knife and Hacker
STONES.

Factories at Haverhill and East Haverhill, N. H., and

Evansville and Westmore, Vt.

Genuine OLD RELIABLE,
INDIAN POND (Red Ends),
LETOILE,
DIAMOND GRIT,
UNION,
WHITE MOUNTAIN,
PREMIER MOUNTAIN,
HAWKING MACHINE,
KAGG.

Stones gotten up and labeled in
any style desired.
PRICE AND QUALITY GUARANTEED.
All the above Stones are of good
keen grit and will not glaze.



RIEHLÉ BROS.
STANDARD

SCALES
AND
TESTING
MACHINES

Patent "Self-Adjusting" Railroad Track Scales,
pronounced "the most accurate and durable" over
all competitors at World's Fair, 1876. In use by Penn-
sylvania, Lehigh Valley, Baltimore and Ohio, and other
Railroads. Patent Coal and Hay Scales. Warehouse
and Platform Scales and Scales for all purposes. Ma-
chines for testing materials, all sizes.
Works, 9th st., at Master; Store, 52 S. 4th st., Phila-
delphia. New York Office, 91 Liberty Street.



"DRAW CUT"
BUTCHERS' MACHINES,
Choppers, Hand and Power
Stuffers,
Lard Presses,
Warranted thoroughly made
and the BEST IN USE.

MURRAY IRON WORKS,
Burlington, Iowa.

R. C. PURVIS,
Manufacturer of

Octagon
Tea Pots.

Rear of 407 Cherry St., Philadelphia, Pa.
Send for Price List.

Established in 1839.

Formerly L. & A. G. Coes.

L. COES & CO.

Manufacturers of L. Coes'

GENUINE IMPROVED

AND MECHANICS

Wide Bar Full Length.

Wide Bar Full Length.

Patent Screw Wrenches

UNDER PATENTS DATED

JUNE 26, 1866,
MARCH 23, 1869,
REISSUED 1870.

NOVEMBER 10, 1863,
FEBRUARY 23, 1864,
REISSUED JUNE 1, 1869,
IMPROVED AUG. 1, 1877.

The back thrust when in use borne by the SHANK instead of the Handle.
None genuine unless stamped "L. COES & CO."

WORCESTER, MASS.

Warehouse, 97 Chambers St. & 81 Reade St., N. Y.
DURRIE & McCARTY, Sole Agents.



No. 00 PENNSYLVANIA

MEAT CUTTER

The only Cutter up-
on the Market which
is required the entire
year for family pur-
poses.

READ THE POINTS.

This is the only Cutter ever put on this market that
entirely fills the requirements of a Family Meat Cutter,
Minced and Chopper. Being very compact, one pound of
meat can be cut as readily as a larger quantity, (which is
not the case with other Cutters), while it will cut sausage

meat rapidly and well. It is especially adapted for cutting cooked meats, such as are intended for
Breakfast Hash or Minced Meat, also for Suet, doing the work in a few moments that would require
hours with a mincing knife, and which cannot be properly done with the usual meat cutters gotten up
especially for sausage meat. For these purposes it is used without the spout; but for sausage meat
a good heavy white metal spout is affixed. (See cut.) They come complete with clamp so they can
be clamped on a table or taken off at pleasure. The outside is nicely japanned and edges painted.
The inside covered with "White French Enamel," so they can be easily and nicely cleaned as well as
making them attractive machines. There is no other Meat Cutter upon the market that will take the
place of Meat Choppers sold for this express purpose but cost three times the money. A trial solicited.
No. 00 Improved Pennsylvania Meat Cutter, Price, per doz., \$25. Discount 40 & 10%.

LLOYD, SUPPLEE & WALTON, Philadelphia.

DURRIE & McCARTY, New York City.

PATENT
Elliptic Spring Whistles



FOR
SPEAKING TUBES.
Patented April 23rd 1879.

We call the attention of the trade to the whistle for speaking tubes, represented in above cut, as
being superior, in a mechanical point of view, on account of the

PATENT ELLIPTIC SPRING,

which is much less liable to break and get out of order than the spiral spring usually used. These
whistles being made entirely of metal, are very strong and durable. They are offered in a variety of
styles at very reasonable prices. Send for illustrated circular and quotations.

We also invite an examination of our PATENT REVERSIBLE DOOR LOCKS, which
by their peculiar construction, combine simplicity, strength and durability. In these Locks
the combination of the Patent Lever and Spring renders the latch movement very easy and prompt in
action.

Illustrated catalogues and price lists furnished on application.

TRENTON LOCK AND HARDWARE CO.,

Manufacturers of Superior Building Hardware.

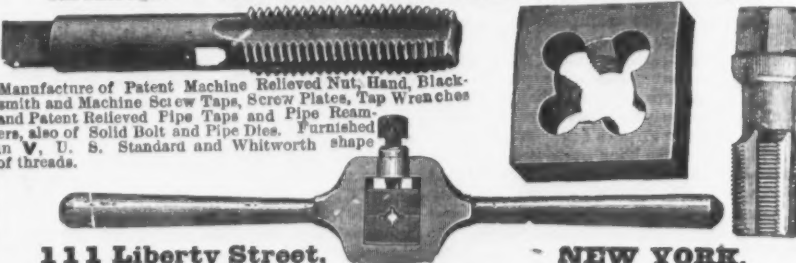
Trenton, N. J.

AGENTS.

JAMES M. VANCE & Co., 211 Market St., Philadelphia, Pa.; JAMES MARSHALL, 48 Warren St., New York.

H. S. MANNING & CO.,

Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO.'S



111 Liberty Street, NEW YORK.

WM. R. HARTIGAN, Burlington, Ct.,

Manufacturer of all kinds of

TOOL HANDLES AND SEAT STICKS FOR CARRIAGES, &c.
Also all kinds of Enamelled Goods made of wood, such as Drop Knobs, Furniture Knobs, Organ Sticks, Brush
Handles, &c. &c. Also sole manufacturer of the Patent ANTI-NERVOUS TRIANGULAR PENSOLDER.
Send for Catalogue and Price List before purchasing. F. R. EMMONS, Agent, 132 Duane St., New York.
Manufacture at BURLINGTON, Conn., U. S. A.

RHODE ISLAND HORSE SHOE CO.,

MANUFACTURERS OF

Horse, Mule & Snow Shoes of the Perkins Pattern.

Works at Valley Falls, R. I., and Buffalo, N. Y. Office, 31 Exchange Place, Providence, R. I.

W. CARPENTER, President.

G. H. PERKINS, Gen'l Manager.

B. W. COMSTOCK, Secretary.

just passed has presented few features of difference from former weeks. Prices have advanced steadily on most grades, and buyers declining to pay a price one day come in the next to reluctantly give it, when they confronted by an advance of \$1 or more, or by the announcement that the iron is sold. The Southern furnaces which are in blast are all sold considerably ahead, so that the few lots of Scotch iron coming into the market find a ready sale at profitable prices. We quote to-day, for cash, here:

FOUNDRY IRON.

No. 1 Hanging Rock Charcoal or Coke	\$43.00 @ 44.00
No. 2 "	41.00 @ 42.00
No. 1 Hanging Rock Coke	42.00 @ 43.00
No. 2 "	40.00 @ 41.00
No. 1 Southern, Charcoal or Coke	41.00 @ 42.00
No. 2 "	40.00 @ 41.00
No. 1 Southern Coke	41.00 @ 42.00
No. 2 "	40.00 @ 41.00
Silver Gray	37.00 @ 39.00
Scotch	40.00 @ 41.00

MILL IRON.

Hanging Rock, Cold-short and Neutral. 38.00 @ 40.00
No. 1 Southern 37.00 @ 38.00
No. 2 " Mottled and White. 35.00 @ 37.00
Missouri Red-short 45.00 @ 47.00

W. B. BELKNAP & Co., Iron and Steel merchants, Nos. 113 and 115 West Main street, report to us as follows, under date of January 19: Volume of business seems to be on the increase, the natural spring trade lending its aid to the heavy purchasing consequent on a large demand and a rising market. Iron has stiffened perceptibly since our last report and Nails are firm at the advance. The agent of one large mill notifies us that only limited orders will be accepted even now. Nuts and washers are going up disproportionately fast, while railroad spikes, large and small, are scarcely to be had at any price. The market is bare of horse shoes, owing to inability of the factories to supply; the price has advanced to \$5.25 @ \$5.50. It is deemed certain that the opening circular cannot be less than \$5. Burden's rivets rule from 6¢ @ 6½¢ on recent advances from factory and advance in Troy freight rates. Fence wire, both plain and barbed, is fairly excited, while all the staple and minor articles of hardware are bounding upward. The "boom" is apparently stronger than ever, and the impression is gaining ground that good prices have come to stay.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

LONDON, ENG., Jan. 5, 1880.

THE TAY BRIDGE ACCIDENT

has been the topic of the week, but we know little or nothing more about the cause of the disaster now than we did a few hours after it took place. The whole central portion of the structure, and the train which was upon it at the moment of failure, were bodily precipitated into a depth of 45 feet of water after a fall of 100 feet. Divers have been doing their best to ascertain the whereabouts of the wreckage and to recover the bodies of the ill-fated passengers, but the weather has been so stormy that their efforts have had a very bare modicum of success. I will not attempt to weary you either with an account of the bridge, the accident or the subsequent proceedings in connection therewith, seeing that you will doubtless have had abundant details by cable long prior to the publication of this letter. As to the probable cause of the disaster there are many theories—some likely, others of the most ridiculous nature. Sir Thomas Bouch, the engineer who designed the bridge, is of opinion that the train was blown off the rails by a sudden gust of wind, and that its continuous progress broke the girders on the sea side, and so caused the collapse. Another rather probable theory is that some vehicle of the train became derailed and so ruptured the ties. A third idea is that the sudden change in the temperature from nearly zero Fahrenheit to 40 or 45 degrees, caused disruptions in the brickwork and ironwork sufficient to bring about the catastrophe. Yet another supposition is that the bridge was too weak to withstand the lateral pressure of the wind with the train upon it, and that it was consequently "blown over." The force of the gale was officially tested on shore by an anemometer about the time of the accident, and was found to be blowing at about 72 miles an hour, equal to a pressure of about 42 pounds per square foot. This, it will be remembered, was on the land. In the middle of the river Tay, which runs between two high ranges of hills for a long distance, the pressure might be much more, particularly on occasional gusts. It is highly probable that one such sudden gust accomplished the destruction of the high and wide central spans, the resistance of which, plus that of the broadside of the train, would be very considerable. Mr. Gilkes, one of the constructors of the erection, placed the limit of safety at 96 pounds pressure per square foot, and it does not seem wholly improbable that that apparently excessive limit had been reached when the girders fell. A good deal of criticism has also been bestowed upon the relative length—2 miles—and width—15 feet—of the bridge, as well as upon its comparatively small cost, £350,000, but upon these heads it is probably sufficient to accept the implied acquiescence of the engineering profession in the soundness of the mode of construction. In any event, and whatever may ultimately be found to have been the active cause of the awful occurrence, it is undeniable that our faith in the engineers has been violently shaken. If the affair happened in the United States, I am afraid people here would have passed it over very lightly, but to have had so terrible a rupture at home has administered a grave blow to national equanimity. It is, perhaps, not too much to say that the accident will nip in the bud many a promising engineering enterprise which has been talked of lately—the channel tunnel to wit. The Forth bridge, having already been ordered and the contracts entered into, will be proceeded with—indeed it is stated that the North British Railway Company have thus early begun to arrange for the reconstruction of the defunct structure. Had steel been the material used, our friends the

iron makers would have had a capital butt for their wits, and steel might have been kept back for another 50 years. As it is the minor carpers are attempting to belittle the Cleveland iron of which the piers, &c., were made, and are also deploring, each in his own way and according to his lights, the use of cast iron instead of wrought iron in many portions of the bridge. The government have taken the matter up, and a Board of Trade inquiry has just been opened. It is intended to give the whole thing a most exhaustive sifting from every available point of view.

THE QUARTERLY MEETINGS

this week have to a great extent been forestalled, in point of interest, by the action of the principal or "list" houses at last week's Staffordshire 'change meetings. I have previously made you aware of the fact that an addition to prices was contemplated, and that the ironmasters had withdrawn all quotations in the interval, with intimations that new orders could only be accepted subject to the rates determined upon at the quarterly gatherings. This course of action had led to the supposition that branded bars would be put up to the extent of £1, and possibly £2, per ton, the larger leap finding most favor in several quarters. It was settled last week, however, that the rise should be £1 on marked bars, which were thereby made £9 per ton, bringing sheets up to £10 and £11 and best plates £10. 10/ to £11. Lord Dudley's bars are 12/6 extra, as usual. This course of action has been timely, inasmuch as it has relieved the uncertainty which was prevalent, and which was tending to hamper the market. Whether the rise will be justified and supported by the subsequent march of events will be seen later on. That warranty may be forthcoming, but at present it is admittedly difficult to perceive the precise why and wherefore of the step. I can quite understand the necessity for securing higher prices, but I, with many others, wholly fail to comprehend the policy of the move. Mere appearances are in favor of "ballooning," I admit, for look where one will there is the universal spectacle of increasing production, keen buying and selling, rises in prices, and, generally, all the indications of a renewed period of inflation. Steady going persons would prefer a more gradual flotation, but they are powerless. Those who are eager to reap the unripe harvest will not be advised, nor will they stay their hands.

SCOTCH PIG IRON

is remarkably buoyant, and at the time of writing warrants are higher than at any time during 1879. Whether this strong feeling will continue, or the contrary, has to be proven, but should advances from your side remain as good as those last received, it is highly probable that the market will go still higher. Owing to the New Year's holidays there has not been a large amount of actual business done since Wednesday last, but operations have been generally resumed to-day, and the immediate future seems unclouded and bright. Makers' quotations have gone up in proportion to other changes, and No. 1's seem quite likely to reach 90/ before long for favorite brands. Ballast pig has advanced 5/, and is 50/ alongside ship. There are 100 furnaces in blast, each being estimated to produce 204 tons weekly.

MR. EDISON'S ELECTRIC LIGHT

experiments and alleged new inventions have excited renewed interest on this side of the Atlantic. The Philadelphia correspondent of the London Times (who is on the staff of the Ledger) has cabled across various particulars of the new horseshoe carbon formed of burnt Bristol board, and vouches for its efficiency in action. The good people of this country who are among the principal holders, numerically speaking, of gas companies' shares, are also regular readers of the Times, by which journal they swear through thick and thin. The extremely favorable telegrams from Philadelphia have frightened these persons, and there has been a considerable drop in many of the shares of this class, owing to the frightened ones trying to get out. They don't experience any particular difficulty in "unloading," for there are many dovetail and innocent stockbrokers and others of that simple ilk who are not unwilling to acquire such good property on fairly easy terms. Thus doth Providence temper the winds of adversity to the shorn lambs of 'Change! Speaking literally, I am afraid the gas shareholders will find that they are the shorn! As a personal opinion, I would be willing to accept as much gas stock at a low figure as anybody might desire to force upon me. I would make a martyr of myself to a notable extent in this cause, despite the genius of Menlo Park. Proverbially it is the unknown which is feared—so it is in this instance. The gas owners are pretty confident of the value of their property, but they fear the phantom looming somewhere ahead, and vaguely imagine that there is a possibility that the new light may suddenly burst forth in all its splendor as the successful rival of gas-lighting. In this rather indefinite and unsatisfactory manner the more timorous ones are sacrificing their interests, which, in turn, are being acquired by a number of amiable gentlemen, who think they have an excellent thing on hand, and wish every joy to as many panics as Mr. Edison may think fit to originate. The sellers would probably be comforted could they peruse the challenge recently addressed by Mr. Sawyer, of New York, to the Sun, of your city, in which Mr. Edison is presented in extremely plain colors. That, however, is not likely to be the case, so that matters must take their own course. In the meantime the electric light continues to make slight progress here. It is being employed in a few large iron works, factories, &c., in different parts of the country, where power is available for running the generating machines, and where gas-fittings are sources of frequent dangers. At some iron and steel works the gas-fittings account for repairs only amounts to some hundreds of pounds yearly. That expense is entirely saved by the use of the electric-light appliances. In London a stretch of about two miles of the Thames embankment is illuminated in this way, from the houses of Parliament at Westminster to Blackfriars Bridge. At Aldersgate street railway station and in the office of the Times the Lontin light is used, with much satisfaction, I am told, in the

latter instance. The Brush system is now being introduced, and the Werderman is already in use at a few large retail establishments, theaters, &c. The new mode of lighting cannot be said to have progressed as some of its advocates had anticipated, but any really cheap and handy method of applying it for household purposes would inevitably meet with great and speedy successes.

IN CLEVELAND

the iron market is very firm, and prices have shown symptoms of going still higher under the influence of the Glasgow advances. There are over 100,000 tons of pig in store in the Cleveland district, besides some 40,000 or 50,000 tons in makers' yards, but this fact does not appear to weigh much on the spirits of those who are concerned in speculating for further rises. The general feeling of the trade is certainly good, and the actual work in hand, especially ship plates, is so considerable in the aggregate that the ironmasters may be pardoned for the hopeful briskness which pervades all their actions and avowed intentions. Current quotations for Middleboro G. M. B. pigs are:

No. 1 Foundry	58/6	No. 4 Forge	53/6
No. 2 "	55/6	Mottled	53/6
No. 3 "	53/6	White	51/6
No. 4 "	51/6	Kentledge	50/6

All net cash, delivered f. o. b. at makers' wharves in the Tees.

There is a greater run on forge than on foundry numbers. Fuel is rather dearer, coke being 13/ @ 14/ per ton, and ironstone is becoming relatively scarce.

THE MANUFACTURED IRON PRODUCTION of the North of England, so far as the firms, companies, &c., comprising the Northern Board of Arbitration are in question, and for the twelve months beginning Dec. 1, 1878, and ending Nov. 30, 1879, are thus summarized by a correspondent:

	1878.	1879.
Rails.	Tons.	Tons.
First quarter	5,618	1,684
Second quarter	8,820	1,447
Third quarter	5,031	1,380
Fourth quarter	2,176	2,257
Total	21,645	6,768
Plates.		
First quarter	30,181	43,722
Second quarter	62,729	47,897
Third quarter	57,627	41,124
Fourth quarter	63,395	41,524
Total	213,932	173,667
Bars.		
First quarter	22,860	13,038
Second quarter	19,584	19,584
Third quarter	17,735	15,041
Fourth quarter	16,082	17,244
Total	76,261	65,848
Angles.		
First quarter	17,622	16,054
Second quarter	23,733	11,331
Third quarter	20,636	9,262
Fourth quarter	23,658	12,244
Total	85,649	48,891
Average prices.	£ s. d.	£ s. d.
Rails	5 3 1	4 18 3
Plates	6 2 6	5 5 4
Bars	5 18 6	5 12 0
Angles	5 7 9	5 0 5
Average	£ s. 7	£ s. 5

The figures are collated from the sworn returns of the official accountant, but it should be borne in mind that at least two of the largest Northern concerns do not now contribute to the board and therefore make no returns of their production.

TIN PLATES AND SHEETS

are quite firmly held on this side—indeed, it is pretty plain that no relapse in prices is possible so long as hematites, sheets, tin, oil, &c., continue to grow dearer almost weekly, as they are doing at the present time. Apart from those cogent reasons, the demand is good, and prospects are so hopeful that the producers in South Wales, Staffordshire, &c., have every inducement to hold up prices now with a view to securing additional imports within the next few weeks.

THE RISE IN PRICES

progresses weekly, and there seems but little chance of the movement being suspended. Among the changes of the past week have been the following: West coast hematite pigs up 5/ @ 10/ per ton, making prices 25. 10/ @ 25; hematite ores, 5/ making quotations 30/ in trucks; Scotch ballast pig iron, 5/ to 50/; Scotch makers' brands, 2/ @ 4/ (see list); shoe rivets, 1/4 d. per lb, making iron 3/4 inch, 17 gauge and upward, 3d. and brass ditto, 9d.; Siddons' tinned hollow-ware, 2½ % less discount, a net rise of 5 %; same maker's cast shoe pins, beaded bills and top spikes are 2/ per cwt. dearer, while lath and wall nails, sad irons, three-legged pots, Dutch stoves, camp ovens, &c., are advanced 1/ per cwt.; German iron foundry, 1/ per cwt. up; wrought iron steam and gas tubes, 5 % less discount, which are thus made 62½ and 65 %; tin plates, cokes, 1/ @ 2/ per box dearer; harness and saddlery, 10 % higher; vises, 2/ per cwt.; door bolts, 1/4 @ 2/ per cwt., and 10 % rise in most kinds of Willenhall locks. In finished iron, Earl Dudley, Messrs. Barrows, and Messrs. Bagnall have advanced quotations £1 per ton. Messrs. N. Millington & Co., of the Summer Hill Iron Works, Tipton, in their circular quote best bars at £10, best best at £11, treble best at £13, and treble best L. M. bars at £15. Rivet iron they price at £10, £10. 5/ and £11. 15/ according to quality; boiler plates at from £11 for best, up to £17 for treble best; and chain iron £10. 10/ for best, and £11. 10/ for best best. The Patent Shaft and Axletree Company, Limited, have advanced the "Brunswick" bars to £9 per ton, and all their other iron in proportion. Messrs. E. P. & W. Baldwin, of the Wilden Works, Stourport, have added £1 to their previously-quoted prices for all their makes of sheets. The prices of the "Mitro" iron of Messrs. Philip Williams & Sons, of the Wednesbury Oak Iron Works, have become 20/ per ton dearer. "Monmoor" brand of boiler plates is now ten guineas, as also "Monmoor" sheets. "Monmoor" crown bars are £8. 15/ and "Monmoor" hoops £9. 5/. The new British Iron Company impose an extra £1 per ton all round. In some of the above cases the rise is £1, but in others 30/.

French's Plumbago Oils.

The Plumbago Oil Company, of Rochester, N. Y., has submitted samples of its oil to Prof. R. H. Thurston, of the Stevens In-

stitute of Technology, with instructions to test it for endurance, gumming, acid, friction, friction in cylinder service and leakage in railroad service. We have before us a little pamphlet embodying the results of Prof. Thurston's tests. The mechanical tests were conducted on a Thurston oil tester, six oils being submitted to each test in order that comparative results might be obtained. The test for the determination of acids was effected by leaving a portion of each of the lubricants in contact with clean copper for several days, the oil being occasionally heated. The formation of a green colored compound of copper in this test is an indication of the presence of acid. Lard showed a slight but quite appreciable amount of acid, and tallow a very considerable amount, while the plumbago oil showed no acid whatever. In a special determination of friction and leakage in case of feeding through cotton waste, as in railroad service, Prof. Thurston endeavored to reproduce as nearly as possible the conditions encountered in actual railroad service. The machine was run at a rate corresponding to 40 miles per hour of railroad travel. An irregular, violent, longitudinal motion was given to the box by shaking it back and forth along the journal by hand, and a blower delivered a current of air against the box. The test consisted of running the machine a length of time equivalent to a trip of a railroad coach of 200 miles, running at 40 miles an hour. The following figures show the relative value of the plumbago oil as compared with the best of the others in each test: Relative power of endurance—plumbago oil, 122; winter-bleached sperm oil, 100; amount of gumming—plumbago oil, 5; prime lard oil, 6; leakage in feeding through waste—plumbago oil, 19; other oils, 100; relative value (endurance, friction and leakage combined)—plumbago oil, 482; winter-bleached sperm oil, 100. Prof. Thurston also allowed samples of the plumbago oils to stand for a period of two months without detecting any precipitation or separation of plumbago.

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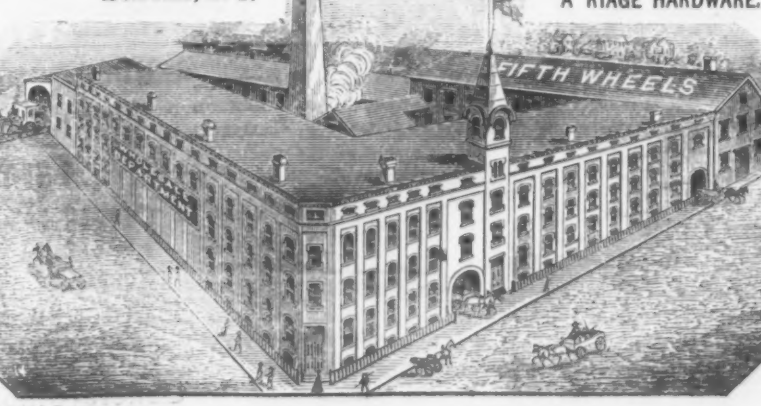
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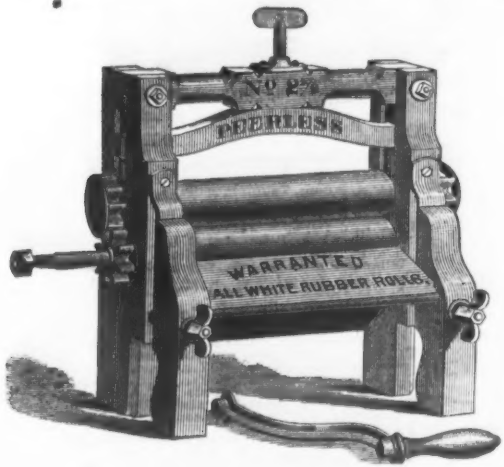


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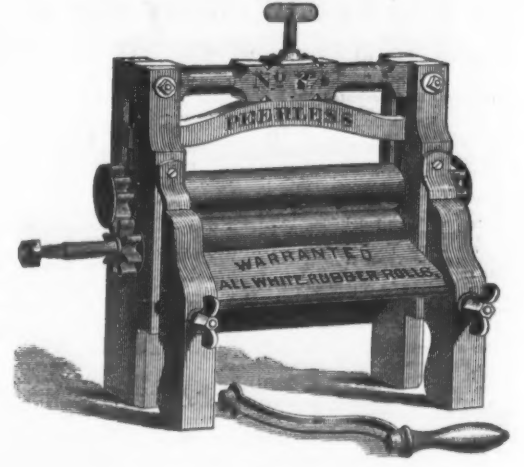
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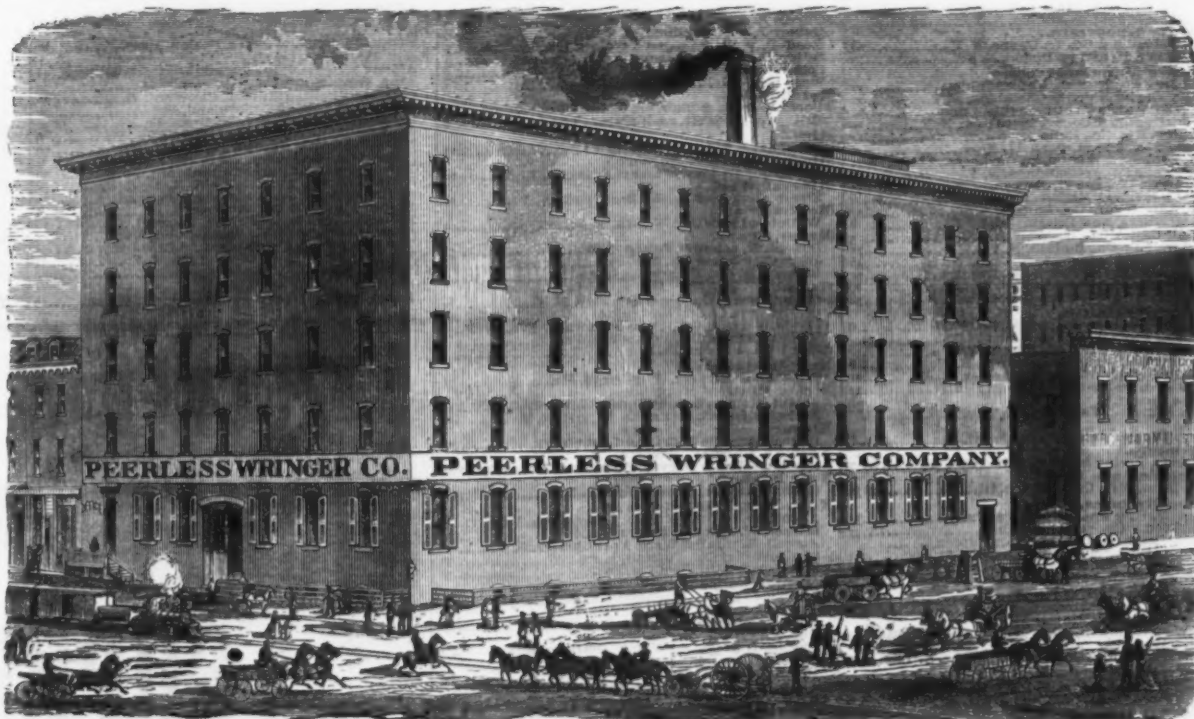
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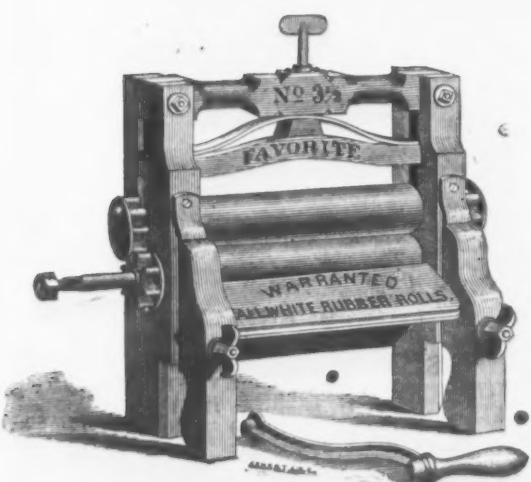
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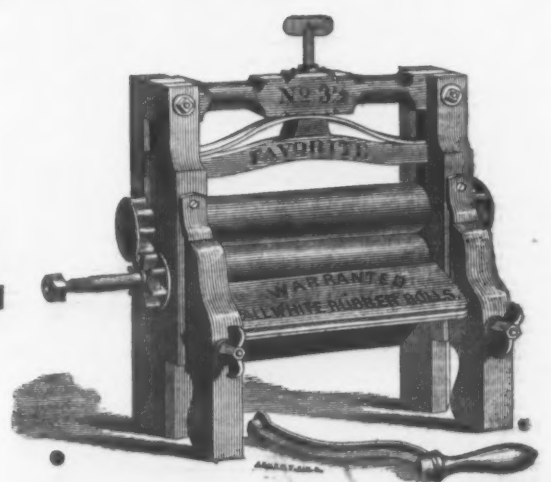
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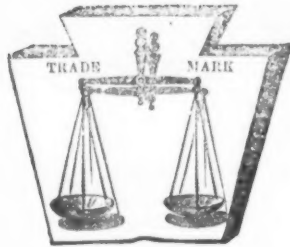
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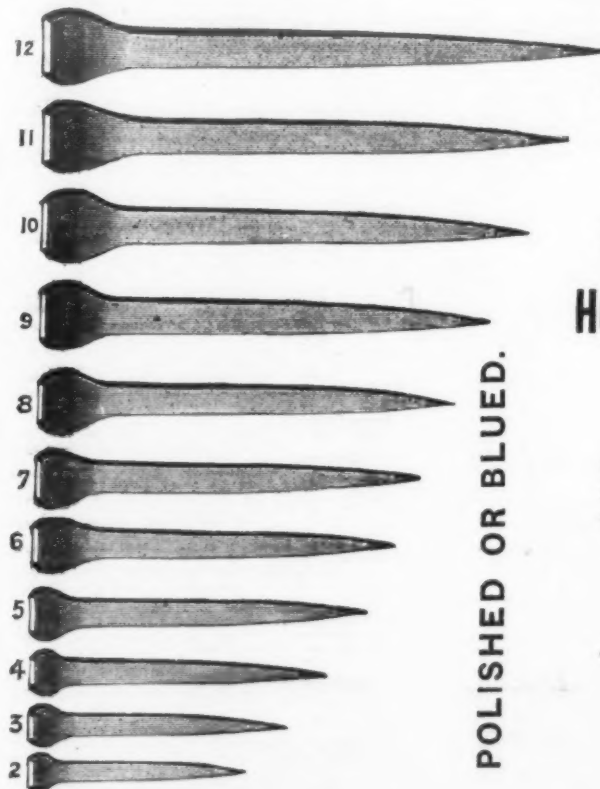


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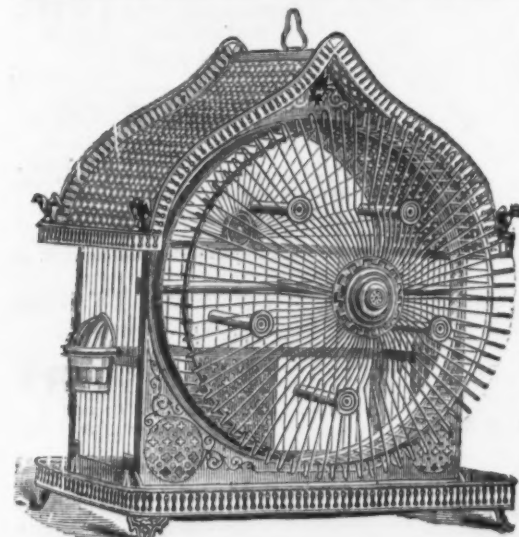
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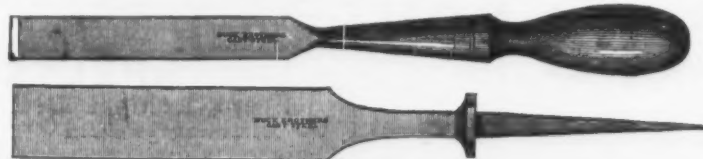


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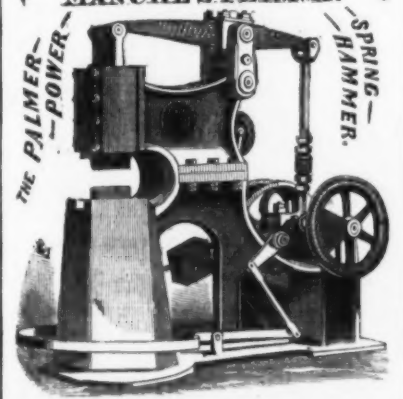
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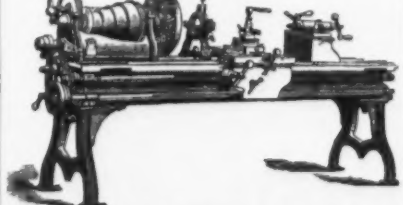
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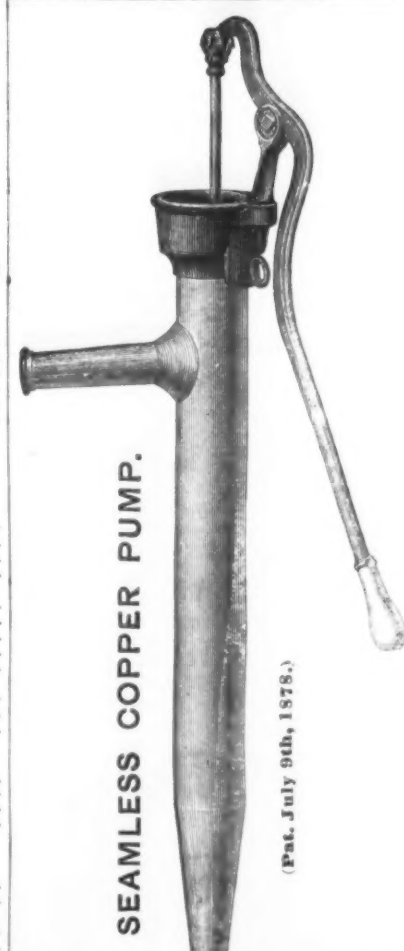


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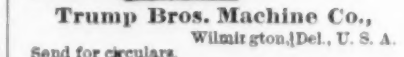
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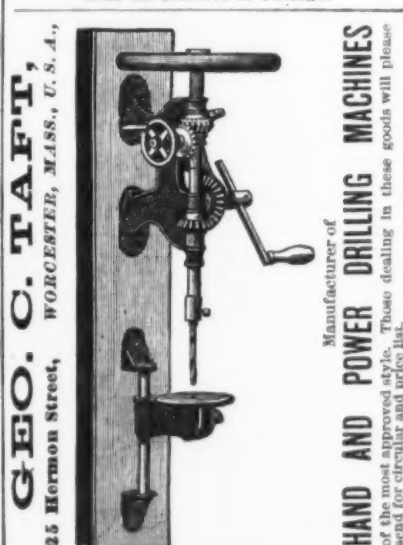
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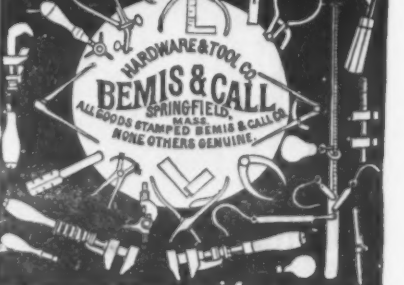
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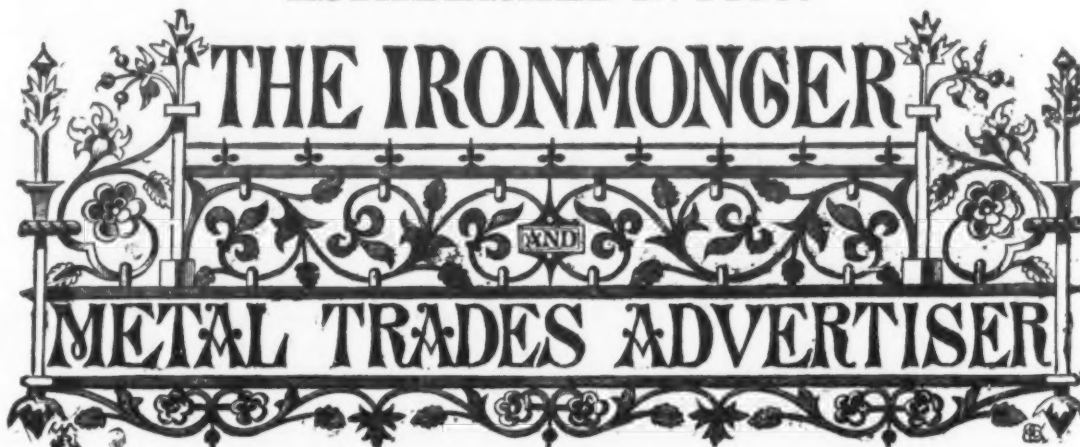
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Electrotype, Roofing Nails,
Barbed Caster Nails.

Vener Nails, Label Tacks and small Nails of all kinds, Cabinet Nails, Barbed Look Nails, Cigar Box Nails, &c., &c., put up in bulk, 5 lb. package 1 lb. papers, or as wanted.

AMERICAN WIRE NAIL CO.
Factory, Fifteenth and Madison Sts. COVINGTON, KY.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 44a CANNON STREET, LONDON, E. C.

ADVERTISEMENTS AND SUBSCRIPTIONS ARE RECEIVED AT THE VARIOUS OFFICES OF "THE IRON AGE," NAMELY:

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PHILADELPHIA OFFICE: 220 South Fourth Street—THOMAS HOBSON, Manager.
CINCINNATI OFFICE: Builders' Exchange—T. T. MOORE, Manager.
SOUTHERN OFFICE: Cor. Eighth and Market Streets, Chattanooga, Tenn.—S. B. LOWE, Manager.

SPECIAL FEATURES.

Notes of Novelties.—This is a department of the journal always watched with interest by the trade, as it contains an account, from week to week, of the novelties which manufacturers and inventors are introducing to the notice of the trade. These articles are freely illustrated.
Special Correspondents.—The *Ironmonger* has a deserved reputation for its special correspondence from all the principal Continental, British and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities for acquiring information specially suited for the columns of the *Ironmonger*. *The Week, Legal News, Trade Notes, Bankruptcies, Foreign Notes, Colonial Settings, Merchants' Circulars, Imports and Exports, &c.* are each departments of the journal, containing a digest of all matters of direct interest to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes, French, Belgian and other Special Correspondence.

SUBSCRIPTIONS

to the *Ironmonger and Metal Trades Advertiser*, with which is sent every fourth week the Foreign Supplement (see below), may commence from any date, but are not received for less than a year complete. The rate is \$5 per annum, inclusive of postage to any part of the world outside Great Britain, and every subscriber is presented, free, in the course of his year, a handsome and useful *Ironmongers' Diary and Text Book*, a work sold to non-subscribers at 75 cents.

ADVERTISEMENTS

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Size of Page—Nine Inches Deep by Six Inches Wide.

One Advertisement of every Series of 13 Monthly, 27 Fortnightly, or 53 Weekly, will be inserted in the *Ironmongers' Diary and Text Book*, published toward the end of each year, and presented to every Subscriber.

	53 INSERTIONS, each net.	27 INSERTIONS, each net.	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.	2 INSERTIONS, each net.	1 INSERTION, net.
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Quarter page.....	5.60	6.00	6.40	7.25	8.00	9.60	11.20
One-sixth page.....	3.95	4.25	4.50	5.10	5.65	6.75	7.75
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One-sixteenth page.....	1.75	1.90	2.00	2.25	2.50	3.00	3.50

SPECIAL ISSUES.

In April and October of each year there is published a Special Issue, the circulation of which is not less than Twelve Thousand (12,000) copies.

THE IRONMONGERS' DIARY AND TEXT BOOK.

This is an annual, presented free to every Subscriber to the *IRONMONGER AND METAL TRADES ADVERTISER*. It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of exceptional value for advertisements. Sold to non-subscribers at 75 cents.

THE FOREIGN SUPPLEMENT

Is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication in 1879 will be as follows:

JANUARY 11, FEBRUARY 8, MARCH 8, APRIL 5, MAY 3 and 31, JUNE 28, JULY 26, AUGUST 23, SEPTEMBER 20, OCTOBER 18, NOVEMBER 15, DECEMBER 13.

This Supplement is published in

FIVE LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach, but in the native language of eighty millions of German, forty-two millions of French, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

Advertisements are inserted in any language at the following

MODERATE TARIFF.

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	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.		13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.
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Two-thirds page.....	22.00	24.75	27.50	One-sixth page.....	7.50	8.45	9.40
Half page.....	17.00	19.15	21.25	One-eighth page.....	6.20	7.00	7.75
One-third page.....	12.50	14.10	15.65	One-sixteenth page.....	3.20	3.40	4.00

Advertisers will do well to use illustrations freely. Where economy of space is an object, a left page illustrated and described in one language can be suitably described in four or more languages on the opposite or right page without illustrating.

THE WHOLE FOREIGN HARDWARE TRADE,

so far as it is experience of twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the *Ironmonger and Foreign Supplement* is a strikingly powerful and most efficient way of publicity not to be compared with any of the other ordinary channels of communication.

B. KREISCHER & SONS, FIRE BRICK.

BEST AND CHEAPEST.
Established 1845.
Office foot of Houston Street, East River,
NEW YORK.

NEWTON & CO.,

ALBANY, N. Y., Manufacturers of

FIRE BRICK

Stove Linings,

Range and Heater Linings

Cylinder Brick, &c., &c.

M. D. Valentine & Bro

Manufacturers of

FIRE BRICK
And Furnace Blocks
DRAIN PIPE & LAND TILE.

Woodbridge, - - - N. J.

BORGNER & O'BRIEN,

Manufacturers of

FIRE BRICK

Edge Pressed Furnace Blocks,
CLAY RETORTS, TILES, &c.,
Twenty-third Street,
A 3076 Race, PHILADELPHIA.
Twenty years' practical Experience.

PERTH AMBOY TERRA COTTA CO.,

Successors to

A. HALL & SONS, Perth Amboy, N. J.,
ARCHITECTURAL TERRA COTTA

FIRE BRICK.

170 Broadway, NEW YORK.

Brooklyn Clay Retort

FIRE BRICK WORKS.

Manufacturers of Clay Retorts, Fire Bricks, Gas
House and other Tile, Cupola Brick, &c. Dealers in
and Miners of Fire Clay and Fire Sand. Clay bank at
Burt's Creek, New Jersey. Manufacture: Van Dyke,
Elizabeth, Richards and Partition Sts., Brooklyn, N. Y.
Office No. 88 Van Dyke St.

Watson Fire Brick Manufactory

ESTABLISHED 1856.

OHN E. WATSON, Perth Amboy, New Jersey,
Manufacturer of

FIRE BRICK,

For Rolling Mills, Blast Furnaces, Foundries,
Gas Works, Lime Kilns, Tanneries, Boiler
and Grate Setting, Glass Works, &c.
FIRE CLAYS, FIRE SAND, AND KAOLIN FOR SALE.

HENRY MAUBER,

Proprietor of the

Excelsior Fire Brick & Clay

Retort Works,

Manufacturer of FIRE BRICK, HOLLOW
BRICK AND CLAY RETORTS.
WORKS PERTH AMBOY, NEW JERSEY
Office & Depot: 418 to 420 East 23d St., N. Y.

TROY FIRE BRICK WORKS

Troy, N. Y.,

JAMES OSTRANDER & SON,

ESTABLISHED 1848,
Manufacturers of

FIRE BRICK,

Furnaces, Tiles, Blast Furnace Blocks, etc. Miners and
Dealers in Woodbridge Fire Clay and Sand, and Staten
Island Kaolin.

Established 1864.

GARDNER BROTHERS,

MANUFACTURERS OF

STANDARD SAVAGE

Fire Brick, Tile & Furnace Blocks,

OF ALL SHAPES AND SIZES.

Clay Gas Retorts and Retort Settings,

AND

Miners and Shippers of Fire Clay.

Office: 175 Penn Ave., Pittsburgh, Pa.
Works: Mt. Savage Junction, Md., and Lockport, Pa.

HALL & SONS,

FIRE BRICK,

Buffalo, N. Y.

MILLER'S BRICK PRESSES

(Established 1844).

FIRE AND RED BRICK,

And Brickmakers' Tools in General.

SAML. P. MILLER & SON,

309 South 5th St., Philadelphia.

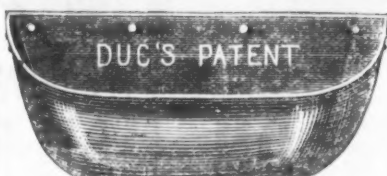
W. & J. TIEBOUT,

Manufacturers of

Brass, Galvanized & Ship
Chandlery Hardware,

No. 890 Pearl Street, New York.

DUC'S IMPROVED ELEVATOR BUCKET.



THE STORE-HOUSE BUCKET.
(Partial straight front.)
In 12 in., 14 in., 16 in. and 17 in. Sizes.

Made of Best Charcoal Stamping Iron.

No Corners to Catch.

Light Running and Very Durable.

The only Scientifically Constructed Elevator Bucket
in the Market.

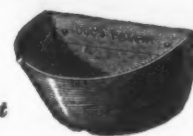
T. F. ROWLAND,

Sole Manufacturer,

CONTINENTAL WORKS, Brooklyn, E. D., N. Y.

Send for Circulars.

NEW YORK OFFICE, NO. 8 BROAD ST.



THE
MILL BUCKET.
In 3 1/2 in. to 10 in.
Sizes.

NICHOLSON FILE CO., Manufacturers of FILES AND RASPS.

ALSO

Filers' Tools & Specialties.

Manufactory and Offices at Providence, R. I.

The following space will be used in illustrating our specialties, the matter being changed weekly.

STUB FILES AND HOLDER.

FILES DETACHABLE. Patented May, 1878.



PILLAR. REAPER. PITSAW. THREE-SQUARE. CABINET.

The above engraving represents a useful and economical device for holding prepared stubs or short files, for shaping and finishing in and around depressions where the ordinary file could not be used, and is shown in the illustration at two-thirds its full size.

The shapes of these stubs may be of almost any of the varieties found in files; and their cut of any character or degree of coarseness required, either as rasp or file.

The character of cut may be varied to adapt them to the work, and in ordering, the nature of the work upon which the files are to be used, should be stated.

This kit will be found to be of especial service in working either upon wood or iron (as upon stove plate and soft metal patterns), stone and zinc monumental work, also in sculptural work in marble, and other work of a similar nature.

The Holder is attached to the files by simply turning the handle, and thus, by means of a screw, forcing the jaws open, and into the recesses prepared for them in the file-stubs. The files are released by turning the handle in the opposite direction.

The kit is prepared for the market in boxes, containing the Holder and six stub files, 2 inches in length. Their sizes and varied shapes will be seen by reference to the above illustrations.

G. W. Bradley's Edge Tools.

Butchers' Cleavers,
Butchers' Choppers,
Axes and Hatchets,
Grub Hoes and Mattocks,
Mill Picks,
Box Chisels and Scrapers,

Ring Bush Hooks,
Ax Eye Bush Hooks,
Socket Bush Hooks,
Watt's Ship Carpenters' Tools,
Carpenters' Drawing Knives,
Coopers' and Turpentine Tools.

FOR SALE BY

MARTIN DOSCHER, Agent, 96 Chambers Street, N. Y.



Established 1838.
Bevin Bros. Mfg.
Co.,
Easthampton, Ct.

Manufacturers of
SLEIGH BELLS.

House, Tea, Hand,
Song Bell's, &c.
all Metal Kettles.

John T. Lewis & Bros
No. 231 South Front St.,
PHILADELPHIA.



TRADE MARK.

MANUFACTURERS OF

Pure White Lead, Red Lead, Litharge,
Orange Mineral, Linseed Oil,
AND PAINTERS' COLORS

Brooklyn White Lead Co.



TRADE MARK.

White Lead, Red Lead & Litharge.
89 Malden Lane, NEW YORK.
FISHER HOWE, TREASURER.

JOHN JEWETT & SONS

Manufacturers of the well-known brand of

WHITE LEAD.



TRADE MARK.

ALSO MANUFACTURERS OF

LINSEED OIL.

182 Front Street, NEW YORK.



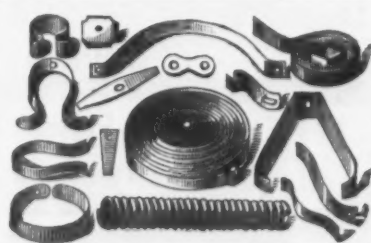
TRADE MARK.

The Atlantic White Lead
and Linseed Oil Co.,

MANUFACTURERS OF

White Lead (Atlantic), Red Lead,
Litharge & Linseed Oil.

ROBERT COLGATE & CO.,
287 Pearl Street, New York



DUNBAR BROS.,

Manufacturers of

Clock Springs and Small Springs

of every description, from best Cast Steel,

BRISTOL, CONN.

Torrey's Door Springs.

P. R. DUNNE,

Manufacturer,



182 Fulton St.,
NEW YORK.

PIANOS

Stool, Cover and Book only \$125.75.
Organs, 18 Stops, 128 Notes, 8000.
Book, only \$25. Paper free.
DAN'L K. BEATTY, WASHINGTON, D. C.

Sheet Cast Steels.

<i>Sheet Cast Steels.</i>					
		1st qual.	2d qual.	3d qual.	Bessemer.
10	to 20 gauge...	13c.	11c.	9c.	8c.
21	to 26 gauge, 1c. extra for each additional gauge.				
Beveled Hoe and Shovel Steel.....					9c.
"	"	"	"	"	8c.

Furnace, Floor and Straightening Plates.....	3
Housings and Castings not otherwise specified.....	3
Guide Plates.....	3
Spindles and coupling boxes.....	3
Sand Rolls and Finlines, large size.....	3
" " small size.....	3
Pipe Mill Castings.....	4
Rolling Mill Castings under 50 lbs.....	3
Spur and Bevel Wheels, large.....	3

Pulleys up to 30 inches.....	4
" over 30 inches.....	4
Engine Castings, light.....	4
" heavy.....	6
<i>Cutted Rolls.</i>	
6 to 7 in. diam., " 20 to 20 in. long.....	8
8 to 15 in. " 8 to 40 in. ".....	8
15 to 24 in. " 15 to 75 in. ".....	8
24 to 31 in. " 75 to 108 in. ".....	8
<i>Horse Shoes, Etc.—In rook lots.</i>	
Juniata Horse Shoes..... per keg, \$4.00	
Mule.....	5.00
" Roadster.....	5.00
Steel Toe Calks..... per lb., less dis. on quantities	

Pulleys up to 30 inches.....
 over 30 inches.....
 Engine Castings.....
 heavy.....
 light.....
 Chilled Rolls.....
 6 to 7 in. diam. 8 to 20 in. long.....
 7 to 15 in. 8 to 20 in. ".....
 15 to 24 in. 8 to 20 in. ".....
 24 to 31 in. 73 to 108 in. ".....

Horse Shoes, Etc.—In 100 keg lots.
 Junfers Horse Shoes..... per keg, \$2.00
 " Mule..... " " 1.50
 " Bolster..... " " 1.50
 Steel Toe Calks..... per lb., less dis. on quantities

White and Red Lead.

Strictly Pure White Lead in Oil, in kegs, in lots of
 500 and over, 95c; less than 500 lb., 9c; in 25 and 50
 lb. casks, 10c; less than 25 lb., 11c; in 10 lb. tin
 Pails, 8c; 5 lb. over per keg price; assorted, 1 to 5, 10 c.
 lb. Cases, 11c.
 Red White Lead, less than 500 lb., 95c; over 500 lb., 90c.
 Orange Mineral, genuine, in kegs, 10c; in barrels, 95c.
 Red Lead, very brilliant,..... 75c; 50 lb. casks, 10c.

White and Red Lead.

Strictly Pure White Lead in Oil, in kegs, in lots of 500 lb and over, 84¢; less than 500 lb, 90¢; in 25 and 50 lb Tins, 94¢; less than 25 lb, 96¢; in kegs, 100¢; 1 to 5 lb, 104¢; 500 lb Cases, 110¢.

Dry White Lead, less than 100 lbs., 84¢; over 100 lbs., 79¢.

Orange Mineral, genuine, in kegs, 11¢; in barrels, 7¢.

Red Lead, very brilliant, 74¢; " " 70¢.

Litharge (Potter's Lead) " 74¢; " " 68¢.

Term: Note at sixty days, or paid within 15 days from date of invoice, a discount of 1½ per cent. will be allowed, but not otherwise.

Window Glass.

Per Box of 50 Feet.—Discount to 5%.

Single Strength.

size.	A.A.	A.	B.	C.
6 x 8 to 10 by 12	\$6.25	\$7.50	\$8.00	\$8.50

Terms: Note at sixty days, or if paid within 15 days from date of invoice, a discount of 1% per cent. will be allowed, but not otherwise.

Window Glass.

Per Box of 50 Feet.—Discount to %.

Size.		A.	B.	C.
6 X 8	10 to 12	88.25	87.50	86.50
11 X 14	10 to 15	9.25	8.50	7.75
11 X 22	10 to 15	10.25	9.75	8.75
11 X 22	16 to 24	10.25	9.75	8.75
11 X 22	25 to 30	10.25	9.75	8.75
16 X 28	10 to 24	11.50	11.50	9.00
20 X 28	10 to 24	14.50	13.25	10.75
20 X 40	10 to 24	14.50	14.00	11.25
30 X 32	10 to 24	15.00	14.00	13.00
30 X 32	25 to 30	15.00	14.00	13.00
34 X 50	10 to 24	17.25	16.25	15.00
34 X 50	25 to 30	18.75	17.25	16.00
30 X 60	10 to 24	18.75	18.75	17.25
6 X 8	10 to 12	13.75	13.75	13.00

10	14	10	16	13	9.71	8.50	8.00	7.30
10	14	10	20	30	10.24	9.75	8.75	7.75
10	14	10	24	30	10.24	9.75	8.75	8.00
20	28	10	24	30	13.00	11.50	9.75	7.50
20	28	10	24	36	14.00	13.25	10.75	8.50
20	28	10	24	42	14.00	13.25	10.75	9.00
30	36	10	30	36	15.00	14.00	13.00	10.00
30	36	10	30	42	17.00	15.25	13.75	11.00
30	36	10	30	48	17.00	15.25	13.75	11.50
30	36	10	30	54	18.25	16.50	15.00	12.00
40	48	10	36	42	20.75	18.75	17.25	14.00
40	48	10	36	48	20.75	18.75	17.25	14.50
6	8	10	10	14	13.75	11.75	10.75	9.00
10	14	10	10	14	14.00	12.00	11.50	11.25
10	14	10	10	20	14.00	12.00	11.50	11.25
15	20	24	30	34	17.00	15.25	14.00	12.50
20	28	36	42	48	21.00	18.50	15.75	14.00
20	28	36	42	54	21.00	18.50	15.75	14.50
20	28	36	42	60	21.00	18.50	15.75	15.00
20	28	36	42	66	24.00	22.00	18.00	16.00
20	28	36	42	72	24.00	22.00	18.00	16.50
30	36	48	54	60	26.75	25.25	23.25	21.00
30	36	48	54	66	26.75	25.25	23.25	21.50
30	36	48	54	72	29.75	27.75	24.75	22.00
30	36	48	54	78	33.25	30.75	27.75	24.00

An allowance 10 per cent. will be charged for all
 orders less than 100 inches.


15 X 14 to 16 X 34	14.50	15.75	12.50	11.25
18 X 22 to 20 X 38	17.25	15.75	14.00	12.50
18 X 20 to 18 X 30	16.75	17.25	14.50	
20 X 28 to 24 X 35	21.00	18.50	15.75	
20 X 22 to 20 X 30	19.50	18.50	15.75	
20 X 40 to 20 X 50	24.00	22.50	18.75	
20 X 28 to 20 X 34	20.75	21.25	19.25	
20 X 38 to 24 X 40	27.75	24.00	21.75	
34 X 38 to 40 X 60	30.75	27.75	24.00	
30 X 36 to 30 X 40	33.25	30.00	27.75	

An additional 10 per cent. will be charged for all bearings 10 inches or more in diameter. Bearings 10 inches in length and not making more than 64 united inches, will be charged in the 84 united inches bracket.

inches in length and not making more than 81 united inches, will be charged in the 84 united inches bracket.


PHOSPHOR-BRONZE,
Acknowledged to be the **Best Metal** for
Bearings, Hydraulic Cylinders,
Pump Rods, Cog Wheels,
Slides, Valves, Bolts, &c.

TRADE MARK.



**Pump Rods, Cog Wheels,
Slides, Valves, Bolts, &c.**

TRADE MARK.



"Phosphor-Bronze."

Pamphlets and particulars on application to
**The Phosphor-Bronze Smelting Co., Limited,
2028 Washington Ave., Philadelphia.**

Sole manufacturing and Phosphor-Bronze in the

"Phosphor-Bronze."

Pamphlets and particulars on application to
The Phosphor-Bronze Smelting Co., Limited,
2028 Washington Ave., Philadelphia.


Sole manufacturers of Phosphor-Bronze in the
United States.

HYATT'S PATENT SPRING BOLT.



Some manufacturers of Phosphor-bronze in the United States.

HYATT'S PATENT SPRING BOLT.



Patented Jan. 29th, 1878.

For Fastening Cabinet Ware, Closet and House Doors, &c.



Patented Jan. 29th, 1878.

For Fastening Cabinet Ware, Closet and House Doors, &c.

We call the attention of the trade to these Wrought Brass and Iron Bolts, as being the best and cheapest in the market. Sizes, two inches and upward, both plain and neck bolts. Two screws fasten the bolt and bed-plate to the wood; no others are required; the bed-plates are made of brass, from which the spring is cut and raised, upon which the bolt slides with an easy, elastic movement, saving expense of screws and producing a strong, handsome and cheap Bolt. Price list furnished on application.

We call the entire line of the trade to these Wrought Brass and Iron Bolts, as being the best and cheapest in the market. Sizes, two inches and upward, both plain and neck bolts. Two screws fasten the bolt and bed-plate to the work; no others are required, the bed-plates are made of brass from which the spring is cut and raised, upon which the bolt slides with an easy, elastic movement, saving expense of screws and producing a strong, handsome and cheap bolt. Price list furnished on application.

BRASS GOODS MFG. CO.,
43 Chambers St., New York.

We also manufacture all kinds of Brass and Tin Goods, Drop Brass, Thimbles and Bases for Door Knobs, Plate Ecuicheons, Brass Labels, Patent Mirror Brass Labels, &c.

THE UNIVERSAL
LETTER LOCK

BRASS GOODS MFG. CO.,
43 Chambers St., New York.

We also manufacture all kinds of Brass and Tin Goods, Drop Brasses, Thimbles and Roses for Door Knobs, Plate Escutcheons, Brass Labels, Patent Mirror Business Cards, &c.

**THE UNIVERSAL
LIFTING JACK,**

For lifting carriages, wagons, heavy loaded teams, fire engines, railway cars, &c. Four sizes, with patent rubber cushions; will not mar the finest painted carriage.

DINSMORE MFG. CO.,

LIFTING JACK,

For lifting carriages, wagons, heavy loaded teams, fire engines, railway cars, &c. Four sizes, with patent rubber cushions; will not mar the finest painted carriage.

DINSMORE MFG. CO.,
235 Washington St.,
BOSTON.

Silver medal awarded by Massachusetts Mechanic Charitable Association.

FOR SALE BY
SARGENT & CO., 37 Chambers St., New York,
MACOMBE, BIGELOW & DOUSE, 136 Oliver St.,
Boston.

**335 Washington St.,
BOSTON.**

Silver medal awarded by
Massachusetts Mechanic
Charitable Association.

FOR SALE BY

SARGENT & CO., 37 Chambers St., New York.
MACOMBER, BIGELOW & DUSE, 156 Oliver St.,
Boston.

ISRAEL H. JOHNSON, JR., & CO.

Tool and Machine Works,
Manufacturers of Lathes of
all varieties (for foot or
steam power), with their
sunlamps, saws, levers and

ISRAEL H. JOHNSON, JR., & CO.

Tool and Machine Works,
Manufacturers of Lathes of
all varieties (for foot or
steam power), with their
supplies, Screw, Lever and
Drop Presses, Shears, Jewelers'
Tools and Machinery.
Also, Northmen's Patent
Rapid Transit Wrench. Design-
ing and Building of
Special Machinery. Mill
Work, &c.

Office: 440 North 17th St.,
Philadelphia.

Drop Presses, Shears, Jewelers' Tools and Machinery. Also, Northmen's Patent Rapid Transit Wrench. Designing and Building of Special Machinery. Mill Work, &c.


Office: 440 North 17th St.,
Philadelphia.



John McLean,
Manufacturer of
Ayers' Hydrants



Stop Cocks & Galvan
Conometer Supplies

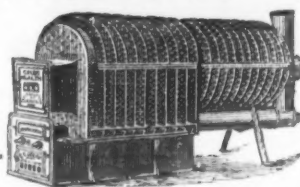


John McLean,
 Manufacturer of
 Ayres' Hydrants

Stop Cocks & Galvan-
 ized Cemetery Supplies.

298 & 300 Monroe St., N. Y.

"HYGEIAN,"
"PERFECT."



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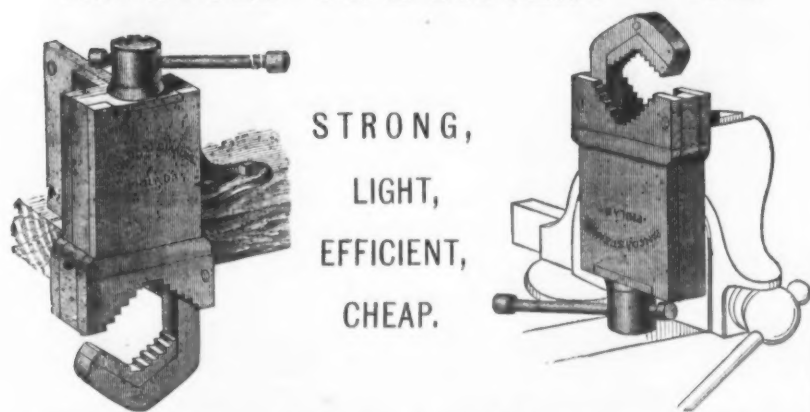
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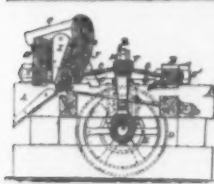
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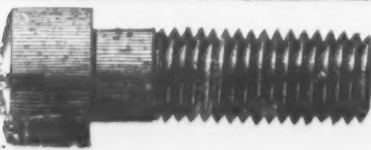
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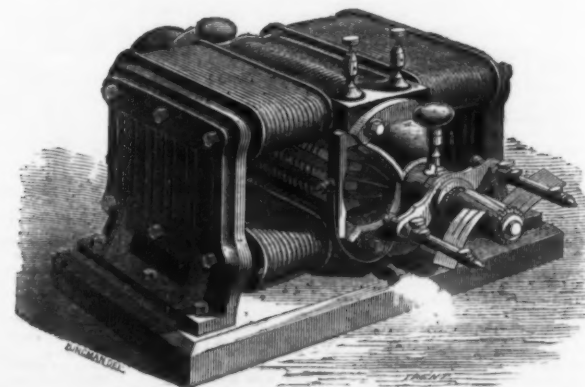
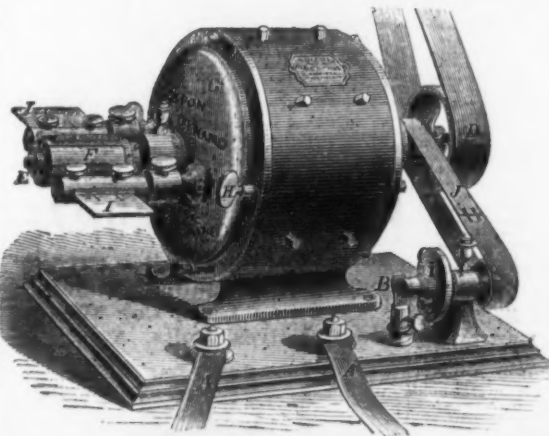
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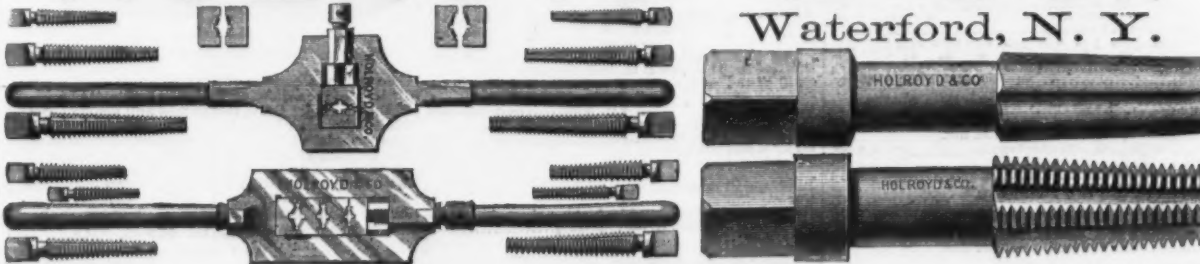
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For Pipe and Bolts,

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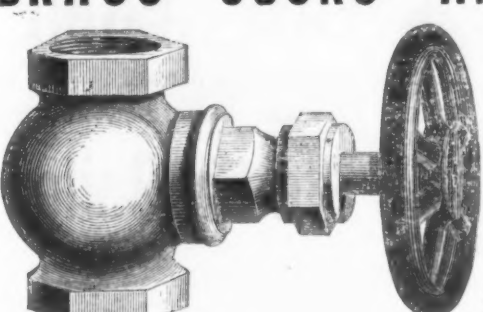
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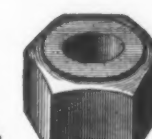

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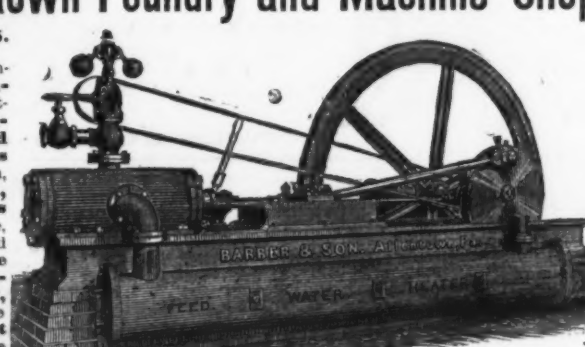
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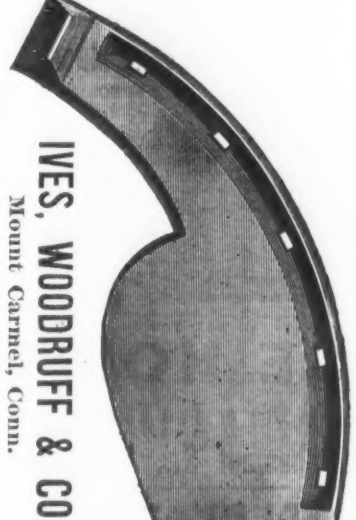
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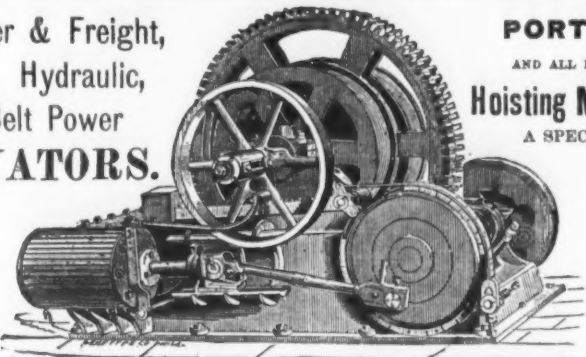


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Co 67

Passenger & Freight,
Steam, Hydraulic,
and Belt Power
ELEVATORS.

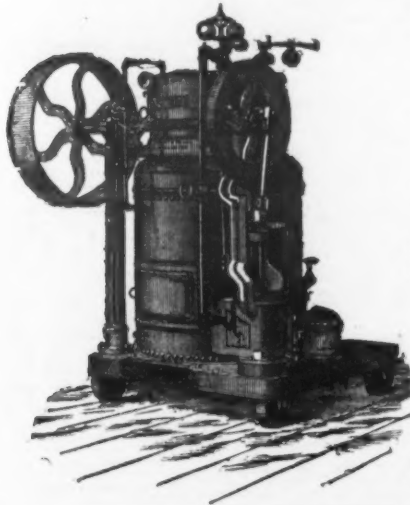


PORTABLE
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Hoisting Machinery
A SPECIALTY.

IRON FURNACE HOIST,

For Handling Stock to Top of Stack with One or Two Platforms.

STOKES & PARRISH, 3001 Chestnut St., Philadelphia.



SHAPLEY ENGINE.

Patented Feb. 10, 1874.
Reissued June 22, 1875.

Compact, Practical, Durable and
Economical.

Acknowledged to be the best in use. This boiler
stands unrivaled.

MANUFACTURED BY

SHAPLEY & WELLS,

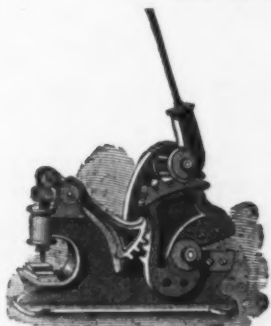
Binghamton Iron Works,
Binghamton, N. Y.

Stationary Engines and Boilers.

Also Machinery for Mills of all kinds and
Tanneries. Also their celebrated Bark
Mills, acknowledged to be the best.
Send for reduced price list circular.

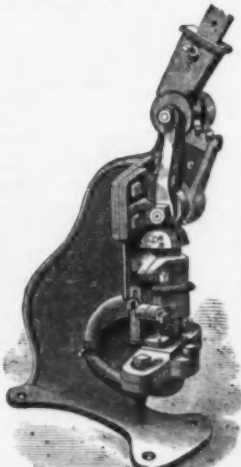
E. LYON & CO.,

No. 470 Grand Street, New York.



Combination Punch and Shears.
Cuts Round and Flat Iron.

SOLE
MANUFACTURER OF



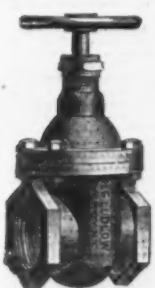
Punch $\frac{1}{4}$ to $\frac{1}{2}$ in., $\frac{1}{4}$ in. Plates.



Shears for Plates and Bars

Lyon's Patent Hand and Power DRILLS, SHEARS AND PUNCHING PRESSES.

For Workers in Iron and Steel, adapted to all trades.
Send for circular and prices.



Ludlow Valve Mfg. Co.,

OFFICE AND WORKS:

988 to 954 River St. & 67 to 83 Vall Ave., Troy, N. Y.

VALVES.

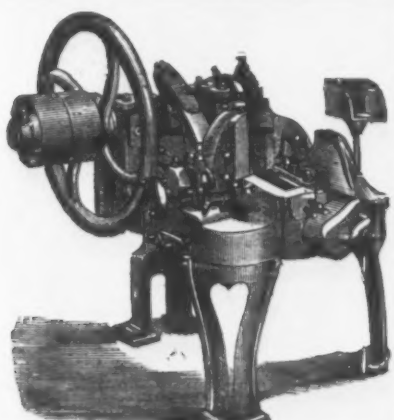
'Double and Single Gate, $\frac{1}{4}$ in. to 48 in.—outside and inside Screws, Indicator, &c.
for Gas, Water and Steam. Send for Circular.

Also FIRE HYDRANTS.

THORNE, DeHAVEN & CO., Drilling Machines,

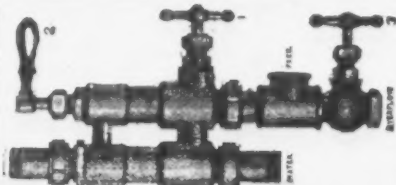
21st Street, above Market, Philadelphia.

PORTABLE DRILLS. Driven by power in any direction.
RADIAL DRILLS. Self-feed—Large Adjustable Box Table.
VERTICAL DRILLS. Self-feeding.
MULTIPLE DRILLS. 2 to 10 Spindles.
HORIZONTAL BORING AND DRILLING MACHINES.
HAND DRILLS. CAR BOX DRILLS.
SPECIAL DRILLS. For Special Work.



PITTSBURGH MFG. CO.

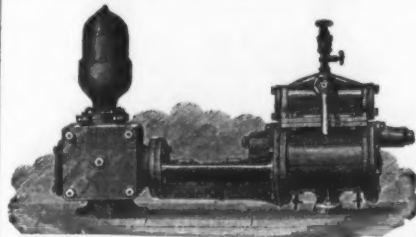
Manufacturers of Nail and Spike Machines, Bolts,
Nuts, Washers, Rivets, &c. Castings, Forgings
and Blacksmith Work promptly attended to.
OFFICE & WORKS, Railroad St., near 20th, Pittsburgh, Pa.



THE HANCOCK INSPIRATOR,

New Combined Pump and Injector.
Eclipses all other appliances hitherto introduced for
feeding Steam Boilers. A Portable Boiler is not per-
fect without one. It lifts its water 25 feet with a low
steam pressure, and puts it directly into the Boiler.
No adjustment necessary for varying steam pressures.
G. W. STOKER, General Agent, 140 N. 3d St., Phila.

Manufactured by
Crane Bros.
Mfg. Co.,
CHICAGO.



A. S. CAMERON'S PATENT

"SPECIAL" STEAM PUMP

Is the Standard of Excellence at Home and Abroad.

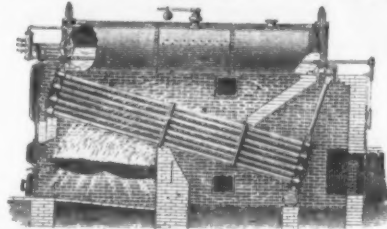
For reduced price lists address A. S. CAMERON, East 23d Street, New York.

Babcock & Wilcox Water-Tube Steam-Boiler

OVER 35,000 HORSE-POWER NOW IN USE. ADAPTED FOR ALL PURPOSES.

SAFETY FROM

In Sections Easy of Transportation.
No Bolted, Screwed or Packed Joints.
All Joints Made by Expanding Wrought
Iron Tubes into Bored Holes.
Can be Erected or Repaired by Ordinary
Mechanic.



EXPLOSIONS.

Easily Cleaned from Soot or Sediment.
Adapted to all kinds of Fuel.
Steady Water Line and Dry Steam.
No Leaks from Unequal Expansion.
Rapid Steaming.
Highest Attainable Economy.

CENTENNIAL EXPOSITION MEDAL AWARDED THIS BOILER FOR HIGHEST ECONOMY AND EFFICIENCY ON TEST.
Illustrated Circulars and other desired information promptly furnished. **BABCOCK & WILCOX, Engineers, 30 Cortlandt St., N. Y.**

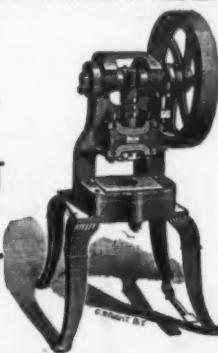
Bliss & Williams, PRESSES and DIES.

MANUFACTURERS OF ALL KINDS OF



Also Manufacturers of
SPECIAL MACHINERY

FOR
WORKING SHEET
METALS, &c.
FRUIT & other
CAN TOOLS.



Plymouth, Pearl and
John Streets,
BROOKLYN, N. Y.,

U. S. A.



PARIS EXPOSITION, 1878.



WM. COOKE,

(Successor to COOKE & BEGGS),

Agent for the

HOPE Vertical Engines,

AND A PATENT

STEAM TUBE CLEANER,

Working on an entirely new principle.

DEALER IN

Railway,
Steamship,
Manufacturers'
Mill and Miners'

SUPPLIES,

6 Cortlandt Street,
NEW YORK, N. Y.

Catalogue on application.

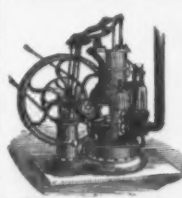


LANE & BODLEY CO.,

MANUFACTURERS OF

STEAM ENGINES, SAW MILLS AND MINING MACHINERY.

LANE & BODLEY COMPANY, Cincinnati, Ohio.



AIR ENGINES. NO WATER. NO ENGINEER.

No extra insurance! Absolutely safe! Simple! Reliable! Durable!
Most convenient and economical power known.

SHERRILL ROPER AIR ENGINE CO.,

Manufacturers of Air Engines, Elevators and Hoisting Machinery
91 & 93 Washington Street, New York.



NAT'L BOLT AND PIPE MACHINERY CO.,
Proprietors of National Head,
Mfrs. of Hand and Power Bolt and Pipe Cutters,
Bolt Pointers, Bolt Headers, Nut Machinery, Hot and Cold-Pressed Taps and Dies, &c.
Send for Circular. **Cleveland, Ohio.**

DEAD-STROKE POWER HAMMERS. CONSTRUCTION IMPROVED.

Prices Reduced. Seven Sizes.
5 to 250 Pounds.



The 15 and 25 pound sizes are specially adapted for
filmmakers' use, the other sizes for general forging.
Send for circular and references.
DIENELT, EISENHARDT & CO.
MAKERS
1306, 1308, 1310 Howard St., Philadelphia, Pa.



KEYSTONE Portable Forges,

All sizes, for the lightest
to the heaviest work, run
by Chain Gear and Flat
Belts. Strong blast and
durable. Send for Cata-
logue and Price list to

KEYSTONE
Forge Co.,
220 Carter St.,
Philadelphia, Pa.

THE PRATT & WHITNEY CO.,

Hartford, Conn., U. S. A.,

Make specialties of

DROP HAMMERS

Punching Presses, Hand Drilling Machines, Ratchet
Drills, Combination Lathe Chucks, Cutters for
Teeth of Gear Wheels, Screw Plates, Hand, Ma-
chine, Nut and Pipe Taps, Bolt Cutters, &c., &c.

ROCK BREAKERS.

Blake's Patent Expired—End of Monopoly.
The undersigned, sole owners of the old Levi-
athan, Gates' patent, and the Brown's patent Rock
breakers, will guarantee our crushers to break
two tons to one of Blake's (or any other). Send
for circulars. Also Stamp Mills and all kinds of
Mining Machinery made on short notice.
Office, 53 Canal Street, Chicago, Ill.

GATES & SCOVILL IRON WORKS.

Shafting, Pulleys,
Hangers, etc.,
a specialty. Send for Price List to

A. & F. BROWN,

57-61 Lewis St., New York.

Machinery, &c.

THE JUDSON GOVERNOR.

It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in accuracy and durability—the main essentials—we guarantee it shall do more.

Reduced Price List,
OCTOBER 15, 1878.

For dimensions of Governor, see Illustrated Price List.

Size, Inch.	Plain.	Bright, Labeled.	Extra for Spec. Dr.	Stop Valve.
1/2	\$15.00	\$17.00	\$1.00	....
1	18.00	20.00	2.00	....
1 1/2	20.00	23.00	3.00	....
2	23.00	27.00	4.00	....
2 1/2	27.00	31.00	5.00	....
3	30.00	35.00	6.00	....
3 1/2	35.00	41.00	7.00	....
4	40.00	46.00	8.00	....
4 1/2	45.00	52.00	9.00	....
5	50.00	58.00	10.00	....
5 1/2	55.00	64.00	11.00	....
6	60.00	70.00	12.00	....
6 1/2	65.00	76.00	13.00	....
7	70.00	82.00	14.00	....
7 1/2	75.00	88.00	15.00	....
8	80.00	94.00	16.00	....
8 1/2	85.00	100.00	17.00	....
9	90.00	106.00	18.00	....
9 1/2	95.00	112.00	19.00	....
10	100.00	118.00	20.00	....

THE JUDSON PATENT

Improved Steam Governor.

No Charge for Boxing or Cartage.

JUNIOUS JUDSON & SON, Rochester, N. Y.

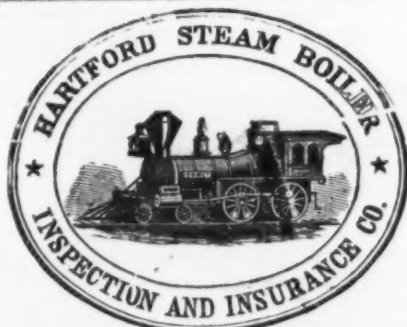
THE SHIVE STEAM ENGINE GOVERNOR.

Reduced Price List, Nov. 1, 1879.

Size of Governor	EXTRA FOR					
	Black.	Fin-ished.	Ball and Lever.	Speed-er.	Auto-matic Safety Check.	Stop Valve.
1/2 In.	\$16.00	\$18.00	\$1.00	\$2.25	.....	\$4.00
1 "	18.00	20.00	2.00	2.35	.....	5.00
1 1/2 "	20.00	23.00	2.25	2.50	.....	6.00
2 "	23.00	27.00	2.50	2.75	.....	7.50
2 1/2 "	27.00	31.00	2.75	2.75	.....	9.00
3 "	30.00	35.00	3.00	3.50	.....	10.00
3 1/2 "	35.00	41.00	3.50	4.25	.....	12.00
4 "	40.00	46.00	4.00	4.50	.....	14.00
4 1/2 "	45.00	52.00	4.50	5.00	.....	16.00
5 "	50.00	58.00	5.00	5.50	.....	18.00
5 1/2 "	55.00	64.00	5.50	6.00	.....	20.00
6 "	60.00	70.00	6.00	6.50	.....	22.00
6 1/2 "	65.00	76.00	6.50	7.00	.....	24.00
7 "	70.00	82.00	7.00	7.50	.....	26.00
7 1/2 "	75.00	88.00	7.50	8.00	.....	28.00
8 "	80.00	94.00	8.00	8.50	.....	30.00
8 1/2 "	85.00	100.00	8.50	9.00	.....	32.00
9 "	90.00	106.00	9.00	9.50	.....	34.00

TO ALL WHO USE STEAM POWER.—We will put our Governor on any engine and warrant it to prove superior to all others, and to do all we claim for it. If, after a fair trial, it does not, we will take it off at our own expense. No charge for boxing. Manufactured by

M. C. & W. D. SMYLYE,

Office, 132 N. Third St., Philadelphia, Pa., U. S. A.
Works, Bethlehem, Pa., U. S. A.

Issues Policies of Insurance after a careful inspection of the Boilers

COVERING ALL LOSS OR DAMAGE TO

Boilers, Buildings and Machinery.

ARISING FROM

STEAM BOILER EXPLOSIONS.

The Business of the Company includes all kinds of STEAM BOILERS.

Full information concerning the plan of the Company's operations can be obtained at the

COMPANY'S OFFICE, HARTFORD, CONN.,

or at any Agency.

J. M. ALLEN, Pres. W. B. FRANKLIN, Vice-Pres. J. B. PIERCE, Sec.

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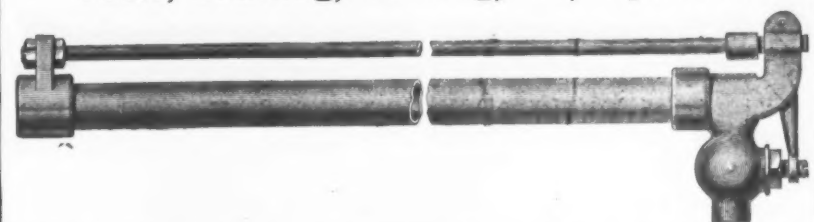
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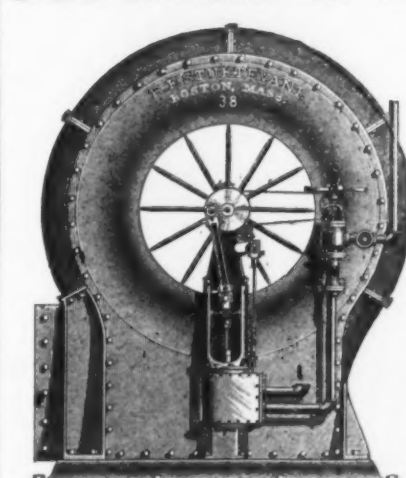
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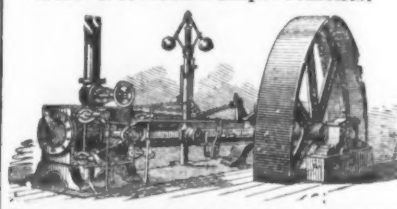
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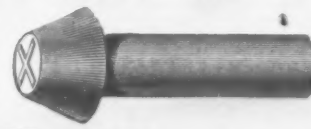
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